INDUSTRIAL PRACTICE REPORT
PT. HADIPUTRA GEMILANG

GIOVANI NATALIA WIDODO
15 14 08440

INTERNATIONAL INDUSTRIAL ENGINEERING PROGRAM
FACULTY OF INDUSTRIAL TECHNOLOGY
UNIVERSITAS ATMA JAYA YOGYAKARTA
YOGYAKARTA
2018

APPROVAL

The internship report which is written based on the Industrial Practice at PT.Hadiputra Gemilang (Tangerang) during the period at December 18, 2017 to January 23, 2018 by:

Name	: Giovani Natalia Widodo
Student ID	: 15 14 08440
Major	: International Industrial Engineering
Faculty	: Industrial Technology

has been approveed.

Yogyakarta,
Faculty Supervisor

On site Supervisor

Susanto Wongso

Ir. Bernadus Kristyanto, M.Eng., Ph.D.

ii

PT. HADIPUTRA GEMILANG
MANUFACTURER - GARMENT - BATIK • EXPORTER - IMPORTER • GENERAL TRADE
Office : Jl. Melawan No. 26/5 Phone : 6019172, 6493105
Fax : 62-21-6019184 Jakarta Pusat - Indonesia
Factory : Jl. Raya Serang Km.22 Industri Phone : 5962179, 59404108
Fax : 5962179. Tangerang - Indonesia

SURAT KETERANGAN

Nomor : 002 / I / HPG / 2018

Yang bertanda tangan dibawah ini menerangkan bahwa :

Nama	: Giovani Natalia Widodo
NPM	: 151408440
Program Studi	: Teknik Industri Kelas Internasional
Institusi	: Universitas Atma Jaya Yogyakarta

Telah melaksanakan Kerja Praktek (KP) di perusahaan kami, PT.Hadiputra Gemilang yang bergerak dalam bidang Industri Tekstil selama 1 (satu) bulan terhitung mulai 18 Desember 2017 sampai 23 Januari 2018 dengan predikat cukup/baik/memuaskan. Lembar penilaian terlampir.

Demikian surat keterangan ini dibuat dengan sebenarnya dan dapat dipergunakan sebagaimana mestinya.

Jakarta, 23 Januari 2018
Hormat kami,

Ir.Suhendra Suhadi
Direktur

ACKNOWLEDGEMENT

This industrial practice report was written as an academic requirement for fulfilling industrial practice course. This report consist of introduction, company background, company system, and industrial practice assignment which done by author. Author would like to thank to God Almighty for His amazing grace and His guidance as well

Author would like to thank to Ir. Bernadus Kristyanto, M.Eng., Ph.D. as author's academic advisor for his support and suggestions during author's project and report writing. Author would like to say gratitude to PT. Hadiputra Gemilang that gives this industrial practice opportunity. That would be good things to be remembered. Author would like to thank to Mr. Suhendra Suhadi as the director the one who give author permission and opportunity on industrial practice, Mr. Susanto Wongso as the Supervisor, Mr. Joni Tan and Mr. Suroso as Mentor which give a lot of information in order author can finish this assignment and arrange this report. All of them gives a lot of lesson and guidance for author during this industrial practice.

Author also would like to thank to beloved friend Billa Oktina Trinugraheni as my partner in industrial practice period and all team involved in this company: Mrs. Elin Kristina, Mrs. Ida Farida, Mrs. Herniyanti, Mrs. Satina Samosir, Ms. Tri Miranti, Mr. Wahab Mardjoko, Mr. Ayong, Mr. Durrachman, Mr. Diran, Mr. Anjar Gumara, Mr. Rahmat, Mr. Piyan, Mr. Wawan, Mr. Yan, Mrs. Nur, Ms. Ria Anggreani, Ms. Warti, Ms. Nuraeni, Ms. Bella Aprilia, and Ms. Amelia.They help author to accomplish the project and give a lot of supports.

On the other hand, author would like to thank to author's parents and friends for their support. They really help author to face any problem during this industrial practice.

Yogyakarta, May 2018

Author

TABLE OF CONTENT

LIST OF TABLE

LIST OF FIGURE

CHAPTER 1

INTRODUCTION

This chapter will focus on introduction which consist of background, objective, industrial practice location and schedule.

1.1. Background of Industrial practice

Department of Industrial Engineering, Universitas Atma Jaya Yogyakarta (PSTI UAJY) defines the industrial practice as a simulator that enables the students not only to apply the Industrial Engineering knowledge into real-world industry but also to train the student how to be a professional of Industrial Engineer. For this purpose, during the industrial practice the students are requested to work in the host company for a period of one month.

The students should keep in their mind, that the paradigm of industrial practice is that the students are expected to experience the application of Industrial Engineering knowledge in practice in which it can be obtained if during their industrial practice the students do some activities to enhance their understanding in term of planning, designing, improving, implementing and problem solving. Therefore during theindustrial practice periods the students are requested to:

a. Doing all the tasks that have been assigned by the host company
b. Following all of relevant working procedures of the host company
c. Capturing the big picture of the enterprise system in the host company and observing its characteristics

Since Industrial Engineer is dealing with the integrated system of some elements which are Man, Machine, Material, Methods, Money, Energy, Environment and Information, therefore during the industrial practice the students should relate all of their activities in term of system perspective. Based on the explanation above, it is clearly seen that industrial practice is not only gathering the data.

According to the Curriculum Document of PSTI UAJY, industrial practice is an academic course in which the students should register for the course for 2 credits. Then, in order to fulfill the academic requirement of industrial practice, the students are required to submit an industrial practice report. The performance of the student itself is evaluated both by on-site supervisor and by faculty supervisor.

1.2. Objective of Industrial practice

The aims of the industrial practice are:

a. Practice discipline

b. Improve the interaction between student and his/her ordinate or workmate

c. Practice adaptability in the working atmosphere

d. Observe the daily work in the host company

e. Enhance the Industrial Engineering knowledge in practice by seeing the practical work in the host company

f. Enhance the knowledge of enterprise system

1.3. Industrial practice Location and Schedule

The industrial practice was held in PT. Hadiputra Gemilang which located in Raya Serang Street Number 9, KM 22, Balaraja, Tangerang-Banten. The industrial practice duration started from December 18, 2017 until January 23, 2018. During the interenship, student has opportunity to know about the company and started to discuss the project that should be done, observe and work on the project. It started with idea proposed, implement in the line, then observe again as the evaluation. The idea that accepted but still not implement yet become suggestion for company. At the last, every works should be submitted and presented.

CHAPTER 2
COMPANY BACKGROUND

This chapter will explain about the company profile, organization structure, and company management.

2.1. Company Profile

2.1.1. Establishment History and the Development of the Company

In the late 1970 Founding Father of PT. Hadiputra Gemilang started Print Batik business with only Manual Print, which were produced by some “Pembatik Local” in Sentra Batik at Karet Area, South Jakarta. At that time, they still worked at home. Now they have a modern factory in Balajara, Serang-Banten. The name of “Hadiputra” itself being used since 1990’s. At the time, Suhendra Suhadi who born on 1965, was fresh graduate from Industrial Bachelor of Tarumanegara University. He tried to work on other people’s company, then finally he decided to manage Batik’s Manufacturer owned by his family.

They sold their Finished Print Batik as Ladies Dress and others at Pasar Tanah Abang, Jakarta for local customers. In middle 1980’s many International buyers came to Tanah Abang and they started bought our products. They sold their “Print Batik” at their countries such as Saudi Arabia, Egypt, United Arab Emirate etc. their International buyers satisfied with their Batik quality and designs, and their buyers came again and bought PT. Hadiputra Gemilang products. Then, the story of their Batik Kraton Mas begins.

In 1991 Founding Father of this company established PT. Hadiputra Gemilang as an institution/company, so they can do manage their export transaction easily. And, some years later they had marketed and totally exported their products to many nations. In 1995 the company has improved its machineries by changing old machineries with the new modern printing machines for production process. With this new machineries now they can produce their products with New Batik Patterns, more fashion and colors known as Modern Batik and Textile patterns.

Their Creative Designers continuously develop their owned design and they also accept specified Batik designs which are requested by their customers and international market. The company steadily increase production capacity and various products from Viscose rayon materials to Rayon Batik garment. They have

their own Brand “Kraton Mas”, which is quite famous in the Middle East and And African countries. The brand can be found at their Ladies Dress products Sarong Batik Print and Premium Products. On the other side, this company also produce products for contract manufacturing, so their buyer can sold Batik that produced from PT. Hadiputra Gemilang and change the brand with their buyer’s brand.

Currently, Hadiputra has around 450 employees on office and manufacturer also around 550 employees in all CMT to accomplish their selling and production capacity so total employee for PT. Hadiputra Gemilang is around 1000 employees. The CMT (Cut-Make-Trim) service in here is come from the people who live around Hadiputra Manufacturer to do the cutting process, sewing process, and folding & packaging process becoming finished goods.

2.1.2. Location and Relocation of the Company

PT. Hadiputra Gemilang area is including the main office in Karet, the manufacturing floor in Balaraja, Tangerang, KM 22, and the warehouse in Balaraja, Tangerang, KM 21. The manufacturing floor is located in Industrial Building Area. Beside that, PT. Hadiputra Gemilang also considering some factors such as :

a. Transportation

The location of PT. Hadiputra Gemilang is quite reacheable with public transportation and personal transportation like car, motorcycle and local transportation, so it makes the delivery process become easier.

b. Raw Materials

The raw materials used from many kind such as the grey fabric, the color/ ink, the chemical material, and the others came from so many suppliers such as PT. Sri Rejeki Isman, PT. Agung Tex, PT. Dunia Tex, PT. Samitex, Multikimia, Kerang Sakti, Colour Indo, Teratai Mas, Dwi Mitra, Mitra Kimia Mas, Chemstar, Sincu, etc.

c. Society/ Environment

This manufacturer is located in the Industrial area and open job field to the people around the factory/ manufacturer. This company also allowed one mini cafetaria owned by people around their factory to open inside their factory area. Beside that, PT. Hadiputra Gemilang also consider environment aspects by providing waste (water) recycling to prevent water pollution and bad effect to the environment.

d. Market

Until now, PT. Hadiputra Gemilang only export their products to International market, they don't have intention yet to sell their products in Indonesia (with another design of clothes and different size).

2.1.3. Achievment of The Company

Even though PT. Hadiputra Gemilang not yet apply the ISO Standard for the company management, this company already has earned several awards that indicate that this company can be viewed as an outstanding company. Below are some achievments obtained by the company :

Figure 2.1. Awards of "*Penghargaan Pengusahaan Indonesia Puri Cikeas Terbaik 2008*"

This awards is obtained by participation of Industri National Textile-Garment by Mr. Soesilo Bambang Yudhoyono (The 6th President of Republic of Indonesia).

Figure 2.2. Awards of "Primaniyarta Indonesia Export Award"

This awards is given in 2012 for Hadiputra Gemilang for category greatest small and medium enterprises that do highest amount of export in textile-garment field. by Gita Irawan Wirjawan (Minister of Trade of Republic of Indonesia).

2.2. Organizational Structure

There are three places that divide those departments which are the main office, in the warehouse and in the manufacturing floor. They have several departments to supports these company to be running well. The main office in Karet consist of accounting department, marketing department, and planning department. While in the warehouse there are only export department and warehouse department. On the other side, in the manufacturing floor consist of production and planning department (Planning, Printing and Production Processes, Design Tracer, Trace Color Match Laboratorium), administration department, and Finishing Department (Cutting, CMT, Folding, Packaging). The production system is not fully automated, they have many operators to do the job. Student placed in Fisihing Department. The student placed is focus on finishing batik garment and take inspection from many types of products. Student's mentor is positioned as the second manufacturer manager, while student's supervisor is positioned as the Head of Maunufacturer Manager. Both of them are placed in the manufacturer site. Main

focused of this team are improvement on the production manufacturing floor and export floor. The organizational structure is shown in figure 2.3.

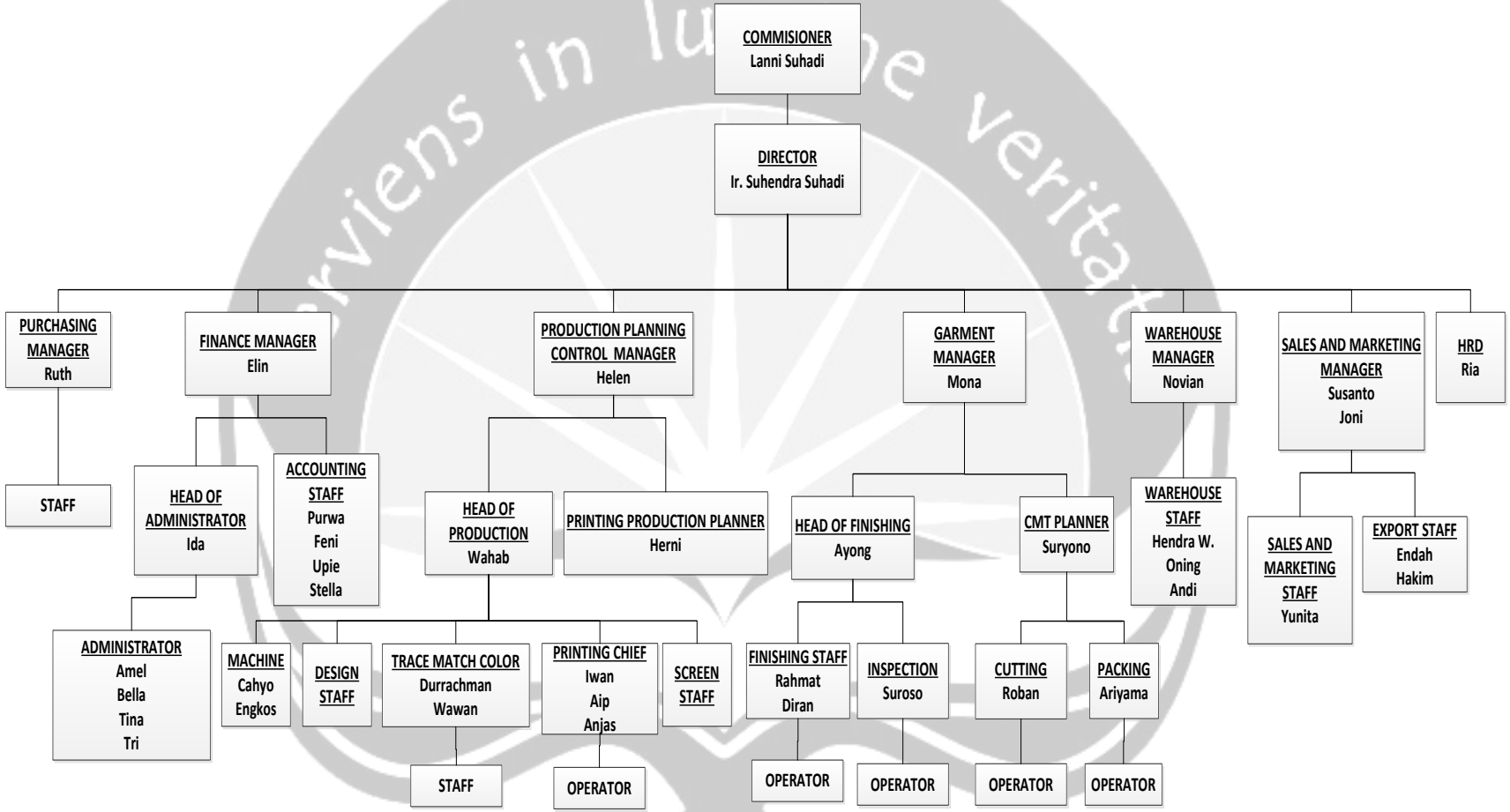

Figure 2.3. Organizational Structure of PT. Hadiputra Gemilang

Every posistion in the organizational structure in Figure 2.1. has different role. Below are the decription of each position :

a. Commissioner

Role:

i. Control and give instruction about the company towards the director.
ii. Make company terms and company big plan.
iii. Evaluate and appraise the performance of the company made by the director.
iv. Control and evaluate the implementation of approved working plan.
v. Aprraise the director.
vi. Make rules and terms with the director to make the company become more effective and efficient.
vii. Evaluate the implementation of company basic budget.

Authority:

i. Fired and hire the director.
ii. Evaluate the approval request about certain transaction according to the terms of company basic budget made by the director.
iii. Make a decision during or out the meeting of commisaris.

b. Director

Role:

i. Communicate and implement terms and condition of the company.
ii. Determine the vision and mision of the company and harmonize the activity of the company according to that vision and mission.
iii. Evaluate the working performance of all managers and give an instruction and correction to all the managers if it's needed.
iv. Lead all of the company operational activity and evaluate the development of company condition periodically and followed by revised action needed.
v. Make final decision for the company according to the condition faced by the company every day.

Authority:

i. Hire and fired the managers.
ii. Authorize certain things and plan made by the managers.
iii. Doing transaction according according to terms of company basic budget.

c. Purchasing Manager

Role:

i. Review all the demand order comes from warehouse department that has been approved by the Head of Finishing Department (warehouse).
ii. Search for vendor or raw material supplier with profitable price and good quality of material that meets company standard/ spesification.
iii. Evaluate reports from supplier or vendor.
iv. Keep checking the raw material price in the markets and update the report about that price.

Authority:

i. Authorize purchase demand that comes in.
ii. Doing transaction with vendor according to the terms of Company company basic budget.

d. Finance Manager

Role:

i. Make a plan, coordination, and control the cash flow of the company.
ii. Arrange and organize company company basic budget, also control cash in and out.
iii. Review accounting report and bank reconciliation.
iv. Checking the Payment Proof and treasury/ Bank Receivable repoport and other supporting documents.
v. Responsible about bills, loans, and investation
vi. Checking tax payment of the company

Authority:

i. Evaluate the making of invoice or bills, tax invoice, also billing and account receivable.
ii. Evaluate things attached to the cash disbursement, such as purchasing raw materials and repairing machine that has beeb authorized by the purchasing manager and the director.
iii. Authorize particular things such as authorization of big amount of spending of cash disbursment.

e. Production Manager

Role:

i. Making production plan, even planning for manufacturer field according to the terms and conditions that has been approved by the director.

ii. Monitoring manufacturing production floor and CMT production periodically followed by some improvements on those quality.
iii. Checking machine performance periodically.

Authority :

i. Evaluate production policies such as overtime working hour, laborers working schedule, weekly or monthly production capacity, etc.
ii. Authorize particular things such as purchasing of raw materials in big amount, repairing on broken machine, or decision on buying new machine to replace the broken machine.

f. Warehouse Manager

Role :

i. Making inventory report in warehouse periodically
ii. Receiving purchased raw material and checking the quality and quantity of the material according to the Purchase Order (PO)
iii. Making sure the raw material is being kept and handled well.
iv. Guarantee the availability of the raw material.

Authority:

i. Requesting raw material purchase order
ii. Rejecting raw material from supplier if it doesn't fit with the quantity or desired spesification of the company.

g. Sales and Marketing Manager

Role:

i. Lead the sales and marketing team
ii. Make a good relationship with the customer and give feedback from customer's advice and critics to the company.
iii. Evaluate customer order based on historical customer data.
iv. Make basic selling terms for short-term period, medium period, and long-term period.
v. Searching for new customer.

Authority:

i. Authorize new customer order.
ii. Doing transaction with the customer according to the company basic budget terms.

h. Garment Manager

Role:

i. Lead the finishing team and CMT (Cut, Make, Trim) department.
ii. Monitoring manufacturing production floor and CMT production periodically followed by some improvements on those quality.
iii. Make sure the material is available to be transfered to CMT department.

Authority:

i. Evaluate finishing and CMT planning policies such as overtime working hour, laborers working schedule, weekly or monthly production capacity, etc.
ii. Evaluate the performance of each CMT.

i. HRD

Role:

i. Monitoring attendance presences of all employees.
ii. Give attendance report toward the supervisor/ head of managers.
iii. Take care of permission things.
iv. Giving final working hour and working schedule for each laborers.
v. Help to input data stock in/out of CMT.

Authority:

iii. Can not receive the permission if the reason is unclear.
iv. Rejecting to give salary bonus toward laborers if they don't do the overtime job/ reach their target.

2.3. Management of the Company

2.3.1. Vision and Mission of the Company

a. Company Vision:

To Be The Biggest "Batik Print Exporter" To Middle East Countries with High Quality Products and Affordable Price.

b. Company Mission:

To Continously Produce the Highest Standards Products with Beautiful Designs and Colours and by Using High Quality Materials. These are the PT. Hadiputra Gemilang Way:

i. Make a garment products with various pattern and innovative Batik design according to world fashion trend and buyers specific qualification/ demand.

ii. Focus to export products to Middle East market with “Batik Kraton Mas” private label.
iii. Choose the highly skill importer expertise in Garment Field.
iv. Make garment products with various colors, models, and high quality according to the buyer’s spesific order.

2.3.2. Salary and Allowance System in the Company

Salary system at PT. Hadiputra Gemilang is divided into 2 namely: monthly and Weekly. The monthly salary is a payment to the official Staff and Managers), while the weekly salary is a payment to the operators/ laborers daily, on the basis of "no work no pay". In providing salary to employees, this company refers to Regional Minimum Wages Standard (UMR) Tangerang & Jakarta District, but the salary of each person can be different based on each individual capability and how long they work for the company. Company also provide facilities in the form of allowances for employees as a form of commitment PT. And Liris towards improving employee welfare with the aim to improve the spirit and work ethic of the people employees. The facilities provided by the company include:

a. Social security of the workforce is Health Insurance
b. Special Allowance (THR).
c. Sickness allowance if there is work accident

2.3.3. Working Hour and Operation of the Company

a. Office Department (in Karet)

Table 2.1. Working Hour and Operation of the Office Department (in Karet)

Working Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Working Hour	8 a.m. – 5 p.m.	8 a.m. – 5 p.m.	8 a.m. – 5 p.m.	8 a.m. – 5 p.m.	8 a.m. – 5 p.m.	8 a.m. – 2 p.m.
Break	12 p.m. – 1 p.m.	12 p.m. – 1 p.m.	12 p.m. – 1 p.m.	12 p.m. – 1 p.m.	12 p.m. – 1 p.m.	12 p.m. – 1 p.m.
Notes	-	-	-	-	-	-

b. Official Staff of the factory/ manufacturer and Warehouse (Admin, Head of each Departments, Factory Managers)

Table 2.2. Working Hour and Operation of Official Staff in Manufacturer and Warehouse

Working Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Working Hour	7 a.m. – 5 p.m.	7 a.m. – 5 p.m.	7 a.m. – 5 p.m.	7 a.m. – 5 p.m.	7 a.m. – 5 p.m.	7 a.m. – 4.30 p.m.
Break	12 p.m. – 1 p.m.	12 p.m. – 1 p.m.	12 p.m. – 1 p.m.	12 p.m. – 1 p.m.	12 p.m. – 1 p.m.	12 p.m. – 1 p.m.
Notes	-	-	-	-	-	-

c. Laboratory and Production Operators

Table 2.3. Working Hour and Operation of the Laboratory and Production Operators

Working Day		Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Shift 1	Working Hour	7 a.m. – 4.30 p.m.	7 a.m. – 4.30 p.m.	7 a.m. – 4.30 p.m.	7 a.m. – 4.30 p.m.	7 a.m. – 4.30 p.m.	7 a.m. – 4 p.m.
	Break	12 p.m. – 1 p.m.	12 p.m. – 1 p.m.	12 p.m. – 1 p.m.	12 p.m. – 1 p.m.	12 p.m. – 1 p.m.	12 p.m. – 1 p.m.
	Notes	-	-	-	-	-	-
Shift 2	Working Hour	4 p.m. – 12 a.m.	4 p.m. – 12 a.m.	4 p.m. – 12 a.m.	4 p.m. – 12 a.m.	4 p.m. – 12 a.m.	4 p.m. – 11.30 p.m.
	Break	6 p.m. – 8 p.m.	6 p.m. – 8 p.m.	6 p.m. – 8 p.m.	6 p.m. – 8 p.m.	6 p.m. – 8 p.m.	6 p.m. – 8 p.m.
	Notes	Only production operator	Only production operator	Only production operator	Only production operator	Only production operator	Only production operator
Shift 3	Working Hour	12 a.m. – 7 a.m.	12 a.m. – 7 a.m.	12 a.m. – 7 a.m.	12 a.m. – 7 a.m.	12 a.m. – 7 a.m.	11.30 p.m. – 6.30 a.m.
	Break	2 a.m. – 4 a.m.	2 a.m. – 4 a.m.	2 a.m. – 4 a.m.	2 a.m. – 4 a.m.	2 a.m. – 4 a.m.	2 a.m. – 4 a.m.
	Notes	Conditional , Only production operator	Conditional ,Only production operator	Conditional, Only production operator	Conditional, Only production operator	Conditional, Only production operator	Conditional,Only production operator

2.3.4. Marketing Strategy of the Company

Mr. Hendra directly targeted his products to be exported in International Market, especially Middle East (Saudi Arabia, Egypt, United Arab Emirate). He choose to make ladies dress ladies dress in Middle East because of the habit of woman in there who only use the dress for 1-3 times, then they will buy another dress again. At least, he wants every woman in the Middle East to have a dozen of Hadiputra products. Currently, 20 countries in the Middle East becoming Export Target of Hadiputra. Now, Hadiputra produce around 1200 dozen of Ladies Dress and in a month this company could export 20 container if in pool/ high season (January-September) and around 5 container in low season (October-December). In low season, Hadiputra wil change their products mostly into Sarong.

2.3.5. Company Facility

Employee plays the most important role and asset in any industry. To ensure that the employee can work optimally, PT. Hadiputra Gemilang strives provide facilities that all employees can enjoy. Here are the facilities provided by PT. Hadiputra Gemilang for employees;

a. Meeting room

This facility aims to support the implementation of the meeting. This room available in every part of the office, aiming for each division part can conducting meetings smoothly, especially meetings that are important, without having to wait.

b. Toilet

There are toliets for laborers/ operator, for the official staff, and for the director.

c. Canteen

This canteen is personal business from outside company. This canteen open from 6 a.m. until 5 p.m.

d. Water Station

The company provide water station for each department everyday.

e. Fire extinguishers

This tools is always available to prevent unexpected things (fire accident) happened.

f. Kitchen

The company provie kitchen for their workers to make a drink like coffee, tea, etc. They could also wash their dishes equipment in this kitchen.

g. Sink

The company provide sink to keep the employee's hands clean.

h. Dorm

The company also provide dorms for their employees whose home are really far from the factory.

CHAPTER 3

COMPANY SYSTEM

This chapter is explained about company system which consist of business process, list of product, production process, and production facilities.

3.1. Business Process

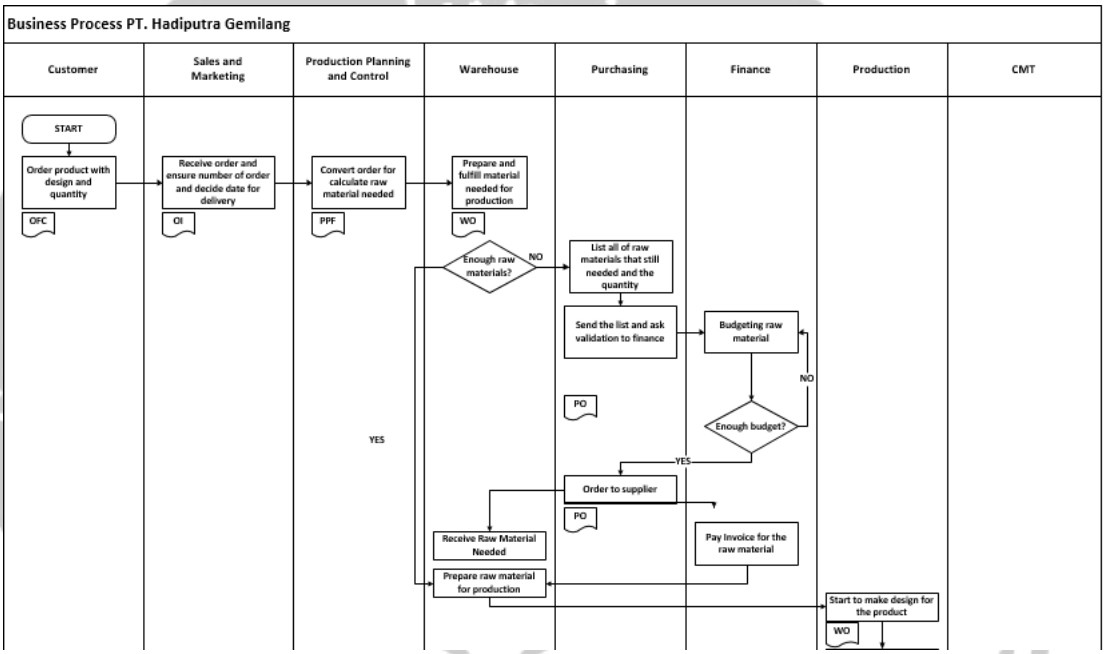

Figure 3.1. Business Process

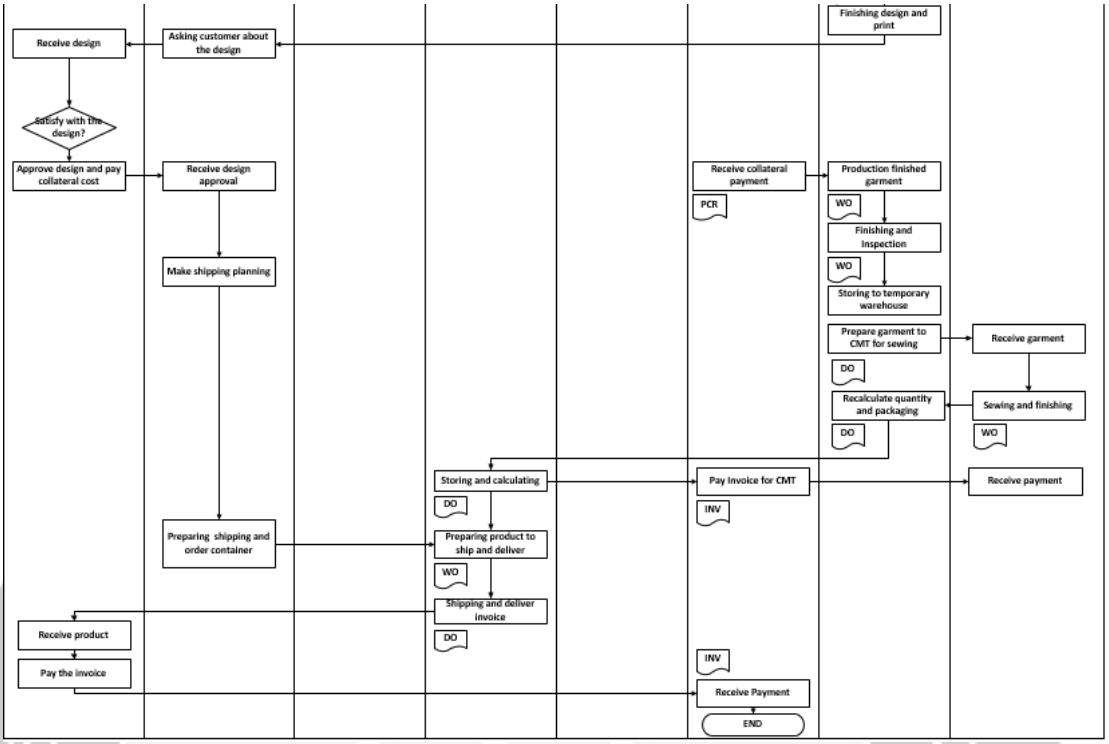

Figure 3.1. Business Process (Continue)

Notes:

The explanation of document used at the flow of the business process are:

i. WO: Work Order
ii. DO: Delivery Order
iii. PO: Purchase Order
iv. POs: Purchase Order from supplier
v. OFC: Order Form Customer
vi. PCR: Payment Confirmation Receive
vii. PPF: Planning Production Form
viii. INV: Invoice from supplier/CMT

This is as the explanation about business process at PT. Hadiputra Gemilang.

i. Customer Order

At the first buyer will order product form PT.Hadiputra Gemilang by giving design of *batik* to the sales and marketing department or buyer can ask some design for them. Order from buyer will record at document named Order Form Buyer.

ii. Negotiate

After receive order, sales and marketing will give the buyer estimation date for product delivery, sales and marketing will negotiate with the buyer. Then, sales and marketing will ensure about the number, design, motif, and color of product that buyer want to buy. Buyer will receive invoice for this negotiate and sales and marketing also has a copied invoice for this.

iii. Production Planning for Buyer Order

After receive buyer order sales and marketing will give copied invoice to the Production Planning and Control Department. In this area, the department will convert all of buyer order into the quantity of raw material needed like how many fabric roll will prepare, the dyes and other raw materials. Then, PPC will make a document name Planning Production Form to calculate. After they calculate, the department will send work order to the warehouse to make preparation of all raw material.

iv. Material Preparation

The warehouse department t will check whether the raw material needed for production is available or not, if the raw material is available, the work order should be return back to PPC department and PPC Department will make copied the work order for the matching color laboratory to calculate number of chemical preparation must be prepare and to the production department. But, when the raw material needed can't be fulfil the order, warehouse department will ask list of raw material needed to purchasing department. Purchasing department will recalculate material needed by warehouse department, if the list approve, purchasing department will make purchase order to finance department. Finance department will budgeting and if the budget is enough they will contact purchasing department so purchasing department can contact to make purchased order for supplier. Supplier will receive purchase order and send the raw material and invoice to purchasing. Then purchasing will give invoice from supplier to finance, after finance make payment, warehouse can directly receive the material needed and start make preparation for production.

v. Production Process

Before they produce a lot of product, matching color laboratory will collaborate with design department to make the sample of the product because at the first when buyer give the design or choose the design, sometimes design is new and haven't

print at the fabric it can be just soft file or paper print and it's not real. To make it real, this two department will make a sample formed a sheet of *batik* garment, then they will send it again to the sales and marketing. Sales and marketing will send the photo for buyer, when buyer approve, buyer will give collateral cost to finance, so the production process can be run follow the instruction of work order from the PPC Department. After production finish until the *batik* garment, the semi-finished product like that will forward to garment department to make finishing and inspection process to ensure there will be no defect found at semi-finished product. Production department give the information by using document named work order.

vi. Sewing Process

The semi-finished product (*batik* garment) will prepare to send to the CMT in order to make finished product that is woman apparel with many types of model and design. The CMT will receive work order and delivery order from garment department that included at production department to sew the *batik* garment into woman apparel. After finish sewing the product, CMT will return back the delivery order to the production department and production department will receive the invoice from the CMT and forwarded to finance to make payment. The production department and warehouse will recalculate number of product with the delivery order and work order has given before it sew, if there is no problem found so production will package the product and send into the warehouse also CMT will get the payment.

vii. Shipping Process

While production process is running, the sales and marketing that helped by purchasing department will make a shipment schedule for the product shipping. The preparation such as order the container, budgeting and rent the truck to deliver. When product is already to deliver, they will make delivery order to the supplier followed by deliver the container of product by ship.

viii. Receiving Finish Product

After product already in shipment process, sales and marketing will contact the supplier. When product is arrived, buyer will get delivery order and invoice from the company. Buyer will calculate and make approval, when the product is clear, buyer will send the payment to the sales and marketing. Sales and marketing will forward it into finance and the business process in end.

3.2. List of Product

Actually, the product from PT. Hadiputra Gemilang is just woman apparel or in Bahasa called as Daster. But, the woman apparel has many variant of design or model. The variated model of product of PT. Hadiputra Gemilang can be shown in Table 3.1. :

Table 3.1. Product Design

No	Model
1	Short Sleeve or BBP
2	Mama Size
3	Small Embro
4	Medium Embro
5	Big Embro
6	Maroko
7	Round Neck
8	Round Neck with Scarf
9	Round Neck with button at the back with Scraf
10	Double Elastic with Scarf
11	Smock
12	S/S Lace
13	S/S Trace
14	Normal
15	Maxi Serot
16	Clock Serot
17	Long Sleeve Manet
18	Breakdance

In this figure can be shown seven top products as the most wanted model which ordered by buyer from PT. Hadiputra Gemilang.

Table 3.2. Most Wanted Design of Product

No	Model	Picture
1	Big Embro	
2	Medium Embro	
3	Small Embro	
4	KLB	
5	BBP	
6	Normal	
7	Maroko	

3.3. Production Process

Production Process at PT.Hadiputra Gemilang conduct by manually and semi-automatic process. Manual process conduct by operator using some equipment, like cutting the fabric, make patter for cutting, inspect finished product and packaging. Semi-automatic process conduct by operator using machine, like designing, printing, washing, scoring, and others process. All of process at PT.Hadiputra Gemilang can be shown below:

3.3.1. Design Process

First production process to make *batik* garment is design the motif. In this company, the design process for the motif is not purely as a new idea from the designer. Design process in this company called as tracing. Tracing process is collect, collaborate and combine some motif or design that already exist into one new design with some improvement or creation. Sometimes when buyer already give the design, design process just make the revision and estimation about contour at the motif as an estimation when it print into the fabric, the color in every contour will be spilled out or not. Design process in this company use design software named Adobe Photoshop. This process take time around 3 days according to level of difficulty and size of design picture. When design easier so design process will be faster. When design process are finished, it will print at the paper and ask for approval. When design approve so the designer will give the soft copy file that shared by LAN to engraphing operator to make the screen and give the printing paper to PPC Department and Matching Color Laboratory.

3.3.2. Engraphing and Perfecta Process

Engraphing process is a process to print the screen of *batik* design. Before printing process, preparation for the screen must be conduct. The screen is make from monyl that stick at the aluminum frame. After that, screen print by printer in this company there are two printers type ATEX 51625E. Then, the screen will go to next process that called perfecta. Perfecta is a process to make the ink of printer will permanently stick at the monyl by so design contour will be shown at the screen or it similar as burning process by ultraviolet that takes time around 2 minutes for every screens using expose machine. Then, the screen will be wash in order to make black ink from the printing loss from the monyl and ready to use.

3.3.3. Trace Matching Color

Matching color is process to formulate chemical preparation in order make a color that can fulfil buyer satisfaction. This process conduct by worker at matching color laboratory at the same time when engraphing process is conduct at the other work station. The color must be specially formulated by the worker that has experience at matching color because color will be shown at the garment is not like usually color that sold at the market. In every color it will contain different dose of chemical preparation. Chemical preparations to make dye are alginate or thickener, urea, dye, hot water, resist salt and sodium carbonate. All of chemical preparation has own function in order to make dye can attached at the fabric. The process is pour all of the chemical preparation, stir until it perfectly in equal condition.

3.3.4. Make Sample

After the screens and dyes are already used to make the sample, then the process to make sample will start. The process to make sample is used one sheet of fabric. The way to put the dyes also using manual way, operator just put the fabric then put the screen over the fabric, manually pour the dyes into screen and make dye equal fulfil the fabric by using leveling equipment. Doing this same process for the other screen and color.

3.3.5. Washing and Drying Process

Washing process is the initial process at production area. In this process the war fabric should be wash by some chemical preparation in order to remove the *kanji* that stick at the raw fabric. Because when the *kanji* was still stick, the dye will not stick well at the fabric and the texture of the fabric will be though/ not smooth. After that, fabric will be go to drying process.

3.3.6. Scoring Process

Scoring process is process to measure the parties of fabric or classification of fabric. In this process fabric will classify based on the length that needed by production planning department. It must be classify because every fabric design has different order, based on color or motif, so the length of fabric must be suitable with the order and effectively used it means minimize connection area and scrap. The fabric will be measured, marked and recorded. All of information will transfer to PPC Department and PPC Department will make planning based on the scoring

process. Scoring process also can be a way to know the percentage shrinkage of a fabric.

3.3.7. Printing Process

After scoring process, fabric will give to printing station based on the length classification. Printing process is a process to print the motif of the *batik* by using flat machine. This process is semi-automatic because even though the machine run automatic by setting the machine program, but the worker must continuously pour the dyes in every screen when it exhausted. In this process fabric are print with several design and color according to the screen that put at the machine.

3.3.8. Ripening Process

This process is conduct to make the color pf *batik* garment as the result of printing process are permanently so when it wash by water or detergent the color will not spilled out. This process is conduct by steamer and cylinder dryer machine. The process if steamer or cylinder dryer is like cooking the *batik* garment by give the garment stem that can make the color will stick permanent into the garment.

3.3.9. Re-washing and Re-Drying

After the *batik* garment are ripped, so it should be re-washing and re-drying again to make alginate or others chemical preparation to make dye stick at the garment removed from the garment. Also in this re-washing process is added by softener to make *batik* garment smoother than before. After washing, the continuously process is re-drying.

3.3.10. Setting process

Setting process is conduct by stenter machine. In stenter machine, *batik* garments are setting in order to achieve the specification. In stenter machine *batik* garment can be set to be wider, longer, shorter or more narrow area based on specification size that needed on order.

3.3.11. Finishing Process

At finishing process, after *batik* garment are finished, it will go to calendar machine. Calendar machine is machine that contain paraffin that can make the *batik* garment will be softer and to remove all the fabric furs or fabric fibers.

3.3.12. Cutting and Inspection Process

Inspection process is a process to check the quality of the *batik* garment, whether is already meet expect specification it means there will be not found any defect or not, if there is any defect product it will be signed or eliminated and if possible to rework it can be rework again. In type of cutting product, the inspection process is conduct parallel when cut the *batik* garment in order to minimize inspection time. Cutting process conduct manually by the worker by using scissor and for cut the pattern of the clothes, it use cutting machine.

3.3.13. Sewing Process

The next step is sewing process. In this step, the *batik* garment will sew and formed as the woman apparel that ready to use. This sewing process is conduct by CMT that cooperate with this company. The processes at CMT are sew the *batik* garment, labeling the garment with the brand and give hand tag at this product. After it finished, CMT will send it again to the company.

3.3.14. Packaging and Labeling Process

This is the last process on the production process. At this step the product will be package at the plastic bag and labeling with some information sticker such as, the motif example KM6750, the size chart and the brand of the company. After that, the packaging of product will re-package using the bag or cartoon in order to make easier when it deliver to the buyer/ shipping process.

The production process is finished.

3.4. Production Facility

3.4.1. Facility Layout

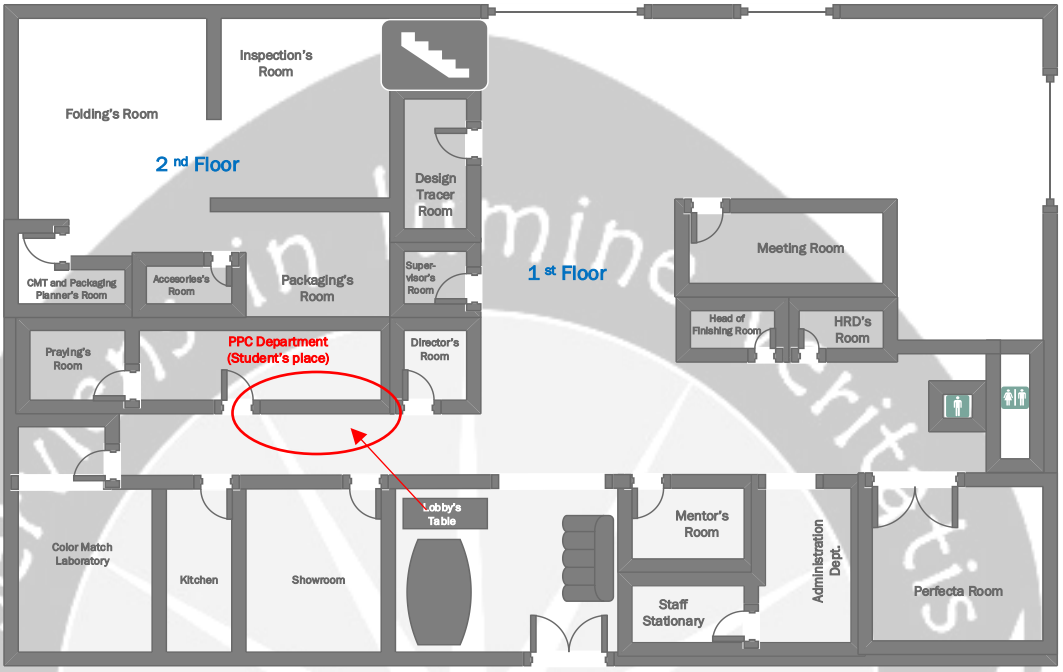

Figure 3.2. Facility Layout of Manufacturer's Office

3.4.2. Production Facility

Production process facilities at PT.Hadiputra Gemiilang are consist of some facilities, there are:

a. Pallet

Pallet is used to put raw materials or product that will be transport or process. After material is processed, material or product will be transported by hand truck. This is the figure of pallet that used in production area and warehouse.

Figure 3.3. Pallet

b. Trolley

Trolley is used to transport the fabric from one work station to other workstation. After the fabric are put in the trolley, so trolley will transported using forklift. This is the figure of trolley that used in production area.

Figure 3.4. Trolley

c. Hand Truck

Hand truck is a material handling that used to transport one product or material from one location to other location. Usually, the product that will transported by hand truck is located on the pallet. Hand truck that used in warehouse of this company is completed by hydraulic mechanism. This is the figure of hand truck that used in production area and warehouse.

Figure 3.5. Hand Truck

d. Forklift

Forklift is used to carry trolley, pallet or others heavy things and placed it in several place. There are three forklift used by this company. This is the figure of Forklift that used in production area and warehouse.

Figure 3.6. Forklift

e. Material Lift

Warehouse of this company is consist of two floors. Material lift uses to carry the finished product that receive at first floor going up to second floor. This is the figure of material lift that used in production area and warehouse.

Figure 3.7. Material Lift

f. Manual Conveyor

Manual conveyor is used to transfer the finished product from labeling and packaging department to truck that deliver finished product to warehouse. This is the figure of manual conveyor.

Figure 3.8. Manual Conveyor

g. Boiler Machine

Boiler machine is power supply form other machine for this company. Boiler machine use coal or oil as the fuel that will be transform into power to run the other machine that need high power. There are two boiler machine types at this company. In this figure can be shown boiler machine that used.

Figure 3.9. Boiler Machine

h. Computer Design

Computer design that use in this company just the basic or regular computer without any special specification. There are seven computers that used to make design for *batik* garment.

Figure 3.10. Computer Design

i. Screen Printing Machine

Screen printing machine is used for print the design on the monyl. There are two machines used for printing on the monyl. At figure can be shown kind of printing machine. Actually, there are two printing machines type ATEX 51625E.

Figure 3.11. Screen Printing Machine

j. Expose Machine

Expose machine is used to burn the screen by ultraviolet light in order to make design contour of the screen will permanently.

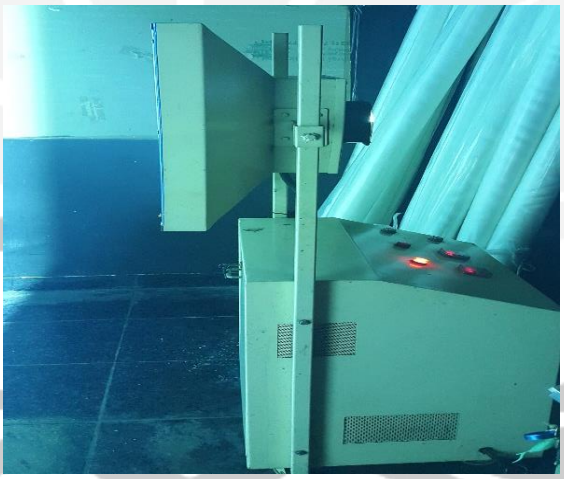

Figure 3.12. Expose Machine

k. Washing and Drying Machine

Washing and Drying machine is a machine to wash grey fabric to make fabric is clear from *kanji*, whitening and softening process. So when grey fabric is coloring by dye, the dye will stick and absorb in the fabric perfectly. Type of washing and drying machine used in JSS Washing Machine.

Figure 3.13. Washing and Drying Machine

Figure 3.14. Washing and Drying Machine

Figure 3.15. Washing and Drying Machine

l. Scoring Machine

Scoring machine is used to measure the length of fabric and give sign in every roll of fabric.

Figure 3.16. Scoring Machine

m. Flat Printing Machine

Flat printing machine is used to print the design of *batik* on the fabric. In this company there are three types of flat printing machines, those are CHANG WON, YU JIN, and ICHINOSE. In this figure can be shown flat printing machine type CHANG WON.

Figure 3.17. Flat Printing Machine

Figure 3.18. Flat Printing Machine

n. Stenter Machine

Stenter machine is used to set the fabric based on needs of customer order, like to make fabric wider or longer than before and also to dry the fabric. There are two stenter machines type IL SUNG at this company. In this figure can be shown the stenter machine.

Figure 3.19. Stenter Machine

Figure 3.20. Stenter Machine

o. Re-washing and re-drying machine

Actually the re-washing and re-drying machine is the washing and drying machine but has different function. This machine is used washed the *batik* garment to make *batik* garment clear from other chemical preparation and drying it. Washing and Drying machine use in this company is WINCH Washing Machine. In this figure can be shown the washing machine.

Figure 3.21. Re-washing and Re-drying Machine

Figure 3.22. Re-washing and Re-drying Machine

p. Steamer Machine

Steamer machine is used to make the dyes are bound permanent and perfectly by steam around in the machine with the fabric, so when *batik* garment wash by the water not all the dye are fade. In steamer machine, half wet of fabric can be processed. Steamer machine type used in this company is WAKAYAMA. In this figure can be shown the steamer machine.

Figure 3.23. Steamer Machine

q. Dryer Cylinder Machine

Dryer Cylinder machine has same function with steamer machine used to make the dyes are bound permanent and perfectly by steam around in the machine with the fabric, so when *batik* garment wash by the water not all the dye are fade. In steamer machine, only dried fabric can be processed. In this figure can be shown the dryer cylinder machine.

Figure 3.24. Dryer Cylinder Machine

r. Calendar Machine

Calendar machine is a machine contain of paraffin in order to make the *batik* garment will be softer and to remove all the fabric furs or fabric fibers. In this figure can be shown the calendar machine.

Figure 3.25. Calendar Machine

s. Inspection Machine

Inspection machine is machine used to inspect the finished *batik* garment by rolling the fabric and the workers will give sign when there are defect found. In this figure can be shown the inspection machine.

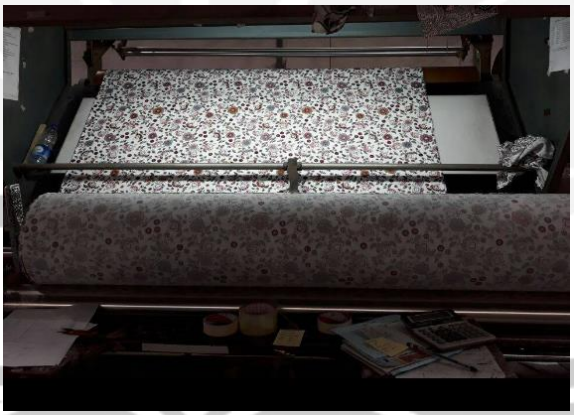

Figure 3.26. Inspection Machine

t. Cutting Machine

Cutting machine is used to cut the pattern model of woman apparel will be produce. Type of cutting machine use in this company is JEL CNV Cutting Machine.

Figure 3.27. Cutting Machine

u. Dye Mixer Machine

Dye mixer machine is used to mix and stir all of materials needed to make dye for the fabric.

Figure 3.28. Dye Mixer Machine

CHAPTER 4

ASSIGNMENT

4.1. Assignment Scope

Student had opportunity with Quality Control Department at PT. Hadiputra Gemilang. This department is one of department that included as one sub-department at the Finishing Department. This department was leaded by Mr.Ayong as the head of finishing department. Quality Control department or this company usually called as inspection department was a sub department that had activity to inspect the preparation product, work in process product and finished product based company's standard quality characteristic in order to give the best product for the customer. Inspection department was spread into five areas, those are:

a. Quality control for Batik finished product (woman apparel)
b. Quality control for Batik fabric type roll
c. Quality control for Batik fabric type cutting
d. Quality control for Batik fabric type sarong and hood
e. Quality control for Batik fabric type textile

Two kinds of quality control areas was collaborated with cutting department. Those areas are the quality control for the cutting product and textile product. That system was implemented because, it would be easier and could reduce a lot of time, when the worker cut and inspected the cutting fabric at the same time. This department also had activities to ensure the number of quantity of finished product that would send to the CMT and receive again the finished product from the CMT. To ensure that, finishing department had a staff that had task to make a work order and receive work order.

When student did this industrial practice, student had a mentor that was a sales and marketing manager that was Mr. Susanto as the one who responsible for the student activity but in daily work student was leaded by Mr.Suroso as the staff at inspection department. Mr.Suroso was a staff from Mr. Ayong it could be seen on the organizational structure of PT.Hadiputra Gemilang. Student not only helped by the mentor Mr.Susanto and Mr.Suroso as the staff of inspection unit, but student also got some help from the production staff, warehouse staff, administration staff and all of the operator or worker which shared information and taught all of the flow of process that student needed to know about whole of the company.

Scope of assignment was given to student was related with inspection for the preparation product, the work in process product and the finished product. When, the inspection process ran out, it was some kind type of reject that often found at the inspection process and this condition was become one of problem for this company faced until now. Based on the problem, so student had a project to learn how the quality control department, what kind activities that run by this department, what kind of quality characteristics was this company expect to satisfy their customer, what kind of reject or defect product usually found, why those type of reject was occurred and how to evaluate and improve the production process in order to minimize the reject product. Based on the problem that faced by this company, so student had an opportunity to follow the quality control process and made a study about every problem that found in this company that have relationship with the quality of the product.

Some of activities that student ran everyday was start with had a briefing from the mentor about what kind activity must be done every day, showed up the project and all of information that was collected in previous day to be checked by the mentor, followed and learned all of activities at quality control department that spread into 5 areas of control because all of area had its own way to inspection, , helped the staff to make work order for the CMT, collected all of the checklist and report for all of the work in process and finished product made the project about the problem occurred also made proposed evaluation and solution for the problem.

4.2. Rights and responsibilities

In this Quality Control or Inspection Department the rights and responsibilities that given to student was related to the problem that occurred at Quality Control Department, like analyze type of reject that mostly found and observe problem in production process what caused the problem and why the problem affect related with quality of product.

Based on the problem, student had task to create an observation talked about how the condition of recent production process in this company based on the reject that occurred in every production, it still good enough or needed improvement. On this task, student will try to evaluate the number and type of reject in every quality control area used the data in one month and try to collect and calculate the data used control chart and Pareto chart as the tools for quality control. Because by used that tools, student could make analyze the distribution and average of reject

product was still in control or not, also by Pareto chart students could get data about the frequency in many types of reject.

The other task was student must do an observation about the mostly reject type that occurred and tried to found the cause of that problem. To solve this problem student would make an analysis with Cause and Effect Diagram as one of quality tools. By this tools, the roots of problem would be known. To do this task, student should know what kind of reject type and classification in the physical product (like when the product was a spotted fabric, in how condition it called as spotted), did full observation also conducted interview to operators or head of production in every step of production and evaluate what kind of step that made many kinds type of reject occurred.

In this industrial practice, besides conducted the observation sometimes student also asked to help the staff to make and check the work order, made production report, filled the checklist and inspected the fabric. This task would make the student like did the real work in quality control. Work order was a sheet contained information about the number of fabric or the other raw materials that must transferred from the one workstation to other workstation or from the manufacturer to outside like office, CMT and shipment party. Checklist or report was a sheet contained information about the production quantity that had inspected also it told the quantity and type of reject product in daily production.

After student conduct the study and observation, so student could propose some evaluation, suggestion and improvement based on the data that given. In order to finish this task, student had rights and responsibilities in this company.

Rights given as following:

a. Student permitted to enter all production area and learn about production process
b. Student permitted to observe the manufacturing process and communicate with mentor, manager, staff and operator
c. Student permitted to take picture and video while manufacturing process
d. Student permitted to access and copied the report for production and schedule
e. Student permitted to help staff record the production report and make some document in order to make student know detail about the whole of the company

Responsibilities given as following:

a. Student should conduct observation and study to find improvement opportunities to know the condition of production process by analyze the reject product
b. Student must give evaluation and collected the information that received on previous day on the next day before student do the industrial practice on each
c. Student should make finished report and submit to mentor

4.3. Methodology to complete the assignment

Methodology used for student in industrial practice at PT.Hadiputra Gemilang as shown in Figure 4.1.

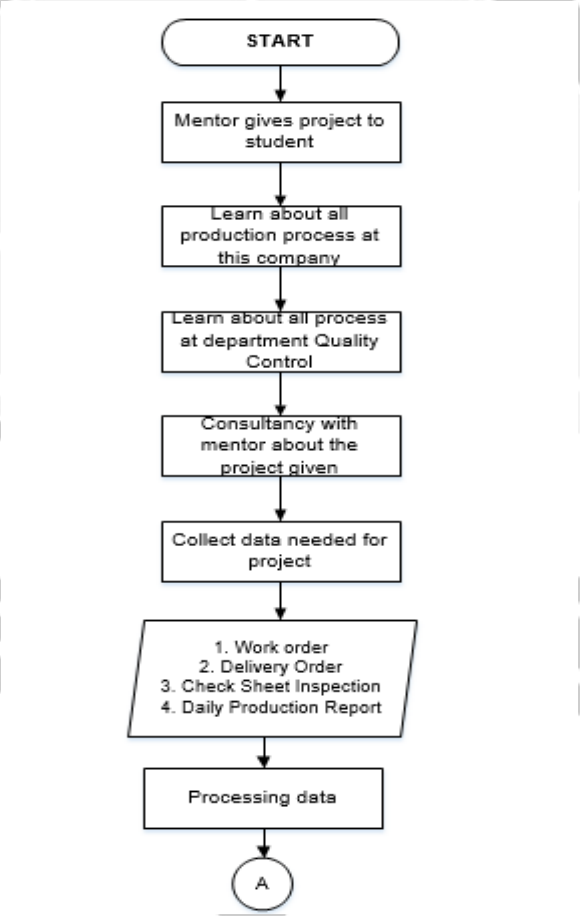

Figure 4.1. Methodology to complete the assignment

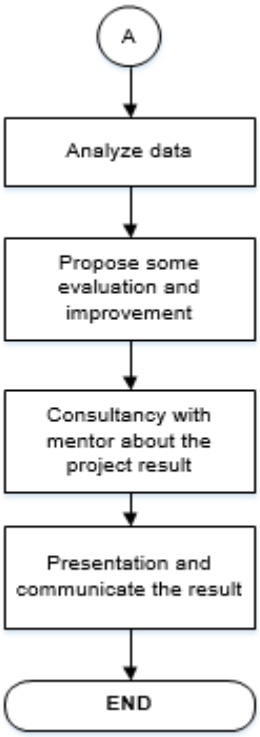

Figure 4.1. Methodology to complete the assignment (Continue)

This is the explanation about every process that shown at flow diagram above:

a. Start

b. Mentor gives project to student

Mentor gives projects to student at the second day of practical work that conduct by student, because at the first day, student had been guided to know about the whole of the process of the company as the introduction. The projects gave to student was explain at the previous chapter which suitable with condition and problem at the Quality Control Department at PT.Hadiputra Gemilang.

c. Learn about all production process at this company

Before conduct the project given by mentor, student had been asked to learn about the production process at that implemented at PT.Hadiputra Gemilang in order to find the description how to conduct the problem given. Student learned by observed and had some interview with the staff and operators to get the information.

d. Learn about all quality control at this company

After student knew all the process, student had been guided to learn deeply about the process in quality control department, how it separated and it worked in order to do the project about problem given at quality control department.

e. Consultancy with mentor about project given

Student consulted with mentor about the project planning that will be conducted later, whether it was true or false. After the mentor agreed so student started to conduct the project.

f. Collecting data

By project planning that accepted, so student needed some data to complete the project. Some of data that needed was the work order and delivery order from production department, check sheet for inspection and the daily production report to make data analysis.

g. Processing data

Processing data conducted by Microsoft Excel and Minitab. Data was separated into some file that had different function. Data separated into 4, data from inspection check sheet, result of analyzing data with control chart, Pareto chart and cause-effect diagram. After all data needed was collected so student started to analyze the data.

h. Analyze data

Based on data received, student started to make analysis of data. Result of data analysis based on the theories at the study literature. To know number of reject was in control or not, it used control chart. To know, the mostly type of reject that occurred, it use Pareto chart and also to know the roots of type of reject, it used cause-effect diagram or usually called as fish bond diagram.

i. Propose some evaluation and improvement

Evaluation and improvement was proposed based on the result of data analysis. When the data analysis showed the bad condition based on the theory so it needed improvement and evaluation in order to increase profit and customer satisfaction for this company.

j. Consultancy with mentor about the project result

After conducted data analysis and gave some evaluation, the result should be consultation with the mentor to receive agreement.

k. Presentation and communicate the result

After the project result signed by the mentor as the agreement so student would be present the project by communicate to the others staff, like head of production and staff in quality control department about the project result.

4.4. Result of industrial practice assignment

4.4.1. Introduction

PT. Hadiputra Gemilang is a manufacturer that conduct the business at garment especially on the woman apparel. As a manufacturer, PT. Hadiputra Gemilang has own product quality in order to make their customer satisfied. Quality is a degree of product that can fulfill customer expectation. To fulfill the customer expectation, it needs a standard for product quality. Quality of product from PT. Hadiputra Gemilang are:

a. Fabric used is comfortable to wear
b. Design given has an esthetic value that beautiful and follow popular design nowadays
c. No defect product when it arrives to customer
d. Size of product given corresponding with exiting size chart
e. If the product is already used there is no unacceptable shrinkage will be found

Sometimes the product is not achieve the quality standard and can't fulfill customer expectation, sometimes the product is defect product. Defect product means that the product is not meet with quality standard of the company. Because of the reason, it must be conduct a quality control process in order to keep the quality of the product. Defect product that occurred is come from any causes from the production process and affect some types of defect. Until now, this company still try to achieve the best production process so it can minimize defect product which produce every day. Based on that problem, student receive project to give analysis about the defect product and propose some evaluations and improvements in order to minimize number of defect occurred through evaluation for production process.

4.4.2. Problem Formulation

a. What kind type of reject that often occurred at PT. Hadiputra Gemilang?
b. How the recent condition about number defect product in PT. Hadiputra Gemilang?

c. What factors which affect many types of reject happened in production process PT.Hadiputra Gemilang?
d. What kind of evaluation and improvement can be done based on reject product in PT.Hadiputra Gemilang?

4.4.3. Assignment Objective

The objectives of this assignment are:

a. To analyze number and type of reject product that mostly found on production process at PT. Hadiputra Gemilang
b. To identify what kind of factors in production process that make reject product so it can be minimized on the next production
c. To analyze and evaluate the production process in order to improve the productivity

4.4.4. Problem Limitation

Problem limitation from this assignment is only based on the data that comes from daily production report and check list of reject product and some added information data about quality control process. Besides that, methodology that used to conduct the project is only based on the explanation from the mentor and some literature study from the university lesson.

4.4.5. Methodology to complete the assignment

For the methodology, it already exist at the previous chapter. Methodology to complete the assignment shown at Figure 4.1.

4.4.6. Theoretical Basis

a. Statistical Process To make P- Chart, it must considered the lower control limit, control limit and upper control limit to know data given is still in control or not. If the data is in under upper limit and upper lower control limit so the data is still in control. But the best result is when the data given is distributed approximately with control limit. To calculate upper control and lower control limit it used formula:

$$CL = p\ bar = \frac{\sum np}{\sum n} \quad (4.1)$$

$$UCL = p\ bar + \sqrt[3]{\frac{p\ bar\ (1 - p\ bar)}{n}} \quad (4.2)$$

$$LCL = p\ bar - \sqrt[3]{\frac{p\ bar\ (1 - p\ bar)}{n}} \quad (4.3)$$

With,

n : Total Production

Σ np : Total Reject Part

Σn : Total Part Inspected

p bar: Average number of reject part

b. Pareto Chart

Pareto Chart is a chart that ranks data classifications is descending order from left to right. The steps to make Pareto Chart are:

1. Determine method to classify the data: by problem, cause or etc.
2. Decide frequency is to be used to rank characteristics.
3. Collect data for an appropriate time interval.
4. Summarize data and rank order categories form largest to smallest
5. Compute cumulative percentage
6. Construct diagram and find review

c. Cause and Effect Diagram

Cause and Effect Diagram is a picture composed of lines and symbols designed to represent a meaningful relationship between an effect and its causes.

4.4.7. Data and Analysis Data

a. Analysis Data using Statistical Process Control (SPC)

There are many types of fabric that found on every types of fabric product at PT. Hadiputra Gemilang, such as textile fabric type, cutting fabric type, roll fabric type also sarong and hood fabric type. In every types, it have different step to conduct the quality control and it caused different type of report will receive. In this data analysis, each data for reject product will analyze using Statistical Process Control that called as Control Chart. The type of Control Chart is P-Chart. P-Chart used in data analysis in order to know the number of defect product in every process is still in control or out of control. So, result of P-Chart will show that reject data distribution. Because data about reject for finished goods is not complete, so it can't be make analysis with Statistical Process Control (SPC).

i. Data and Analysis Data for Reject Fabric Textile Type using P-Chart

From the data obtained, it will represented data about the amount of fabric used and the length of reject fabric. So the data analysis which can be done is to create a P-Chart as control chart for this problem.

Table 4.1. Data Reject Fabric Textile Type on December 2017

No	Design and Color	Fabric used (meter)	Reject (meter)	Proportion	CL	LCL	UCL
1	KM1 6718 Yellow	582.4	9.29	0.00548	0.03554	-0.00336	0.07443
2	KM1 6718 Maroon	582.4	2.13	0.09549	0.03554	-0.00386	0.07493
3	KM1 6718 Blue	560.56	47.53	0.04464	0.03554	-0.01347	0.08454
4	TEX 6718 Grey	291.2	11.8	0.08420	0.03554	-0.01347	0.08454
5	TEX 6718 Violet	291.2	22.62	0.14609	0.03554	-0.01347	0.08454
6	TEX 6718 L.Blue	291.2	40.44	0.07150	0.03554	-0.01347	0.08454
7	TEX 6718 D.Blue	291.2	18.82	0.11997	0.03554	-0.00996	0.08103
8	TEX 6690 L.Blue	364	38.17	0.03239	0.03554	-0.00996	0.08103
9	TEX 6690 Grey	364	10.19	0.00799	0.03554	-0.00996	0.08103
10	TEX 6690 Yellow	364	2.51	0.01999	0.03554	-0.00922	0.08030
11	TEX 6690 Maroon	382.2	6.44	0.05286	0.03554	-0.00996	0.08103
12	TEX 6690 D.Blue	364	18.44	0.04981	0.03554	-0.00996	0.08103
13	KM 6690 Dadu	364	16.53	0.08909	0.03554	-0.00996	0.08103

Table 4.1. Data Reject Fabric Textile Type on December 2017 (Continue)

14	KM 6690 Violet	364	29.73	0.03868	0.03554	-0.01158	0.08266
15	KM 6690 Brown	327.6	11.27	0.03725	0.03554	-0.00996	0.08103
16	KM 6688 Maroon	364	13.56	0.04672	0.03554	-0.01116	0.08223
17	KM 6688 Grey	336.7	15.73	0.03533	0.03554	-0.00958	0.08066
18	KM 6688 Fanta	373.1	13.18	0.06560	0.03554	-0.01034	0.08142
19	KM 6688 D.Blue	354.9	23.28	0.05774	0.03554	-0.00922	0.08030
20	KM 6688 Brown	382.2	22.07	0.09472	0.03554	-0.00958	0.08066
21	KM 6688 Violet	373.1	33.34	0.04915	0.03554	-0.00996	0.08103
22	KM 6688 Yellow	364	16.29	0.11835	0.03554	-0.00996	0.08103
23	KM 6688 L.Blue	364	41.68	0.07887	0.03554	-0.00996	0.08103
24	KM 6688 Green	364	26.41	0.01872	0.03554	-0.00057	0.07165
25	TEX 134 Blue	728	12.83	0.01843	0.03554	-0.00057	0.07165
26	TEX 134 Maroon	728	12.42	0.00618	0.03554	-0.00057	0.07165
27	TEX 134 Brown	728	3.9	0.00398	0.03554	-0.04226	0.11333
28	KM 6718 Dadu	72.8	0.29	0.05769	0.03554	-0.04226	0.11333
29	KM 6718 L.Blue	72.8	4.2	0.01374	0.03554	-0.04226	0.11333
30	KM 6718 Brown	72.8	1	0.01319	0.03554	-0.04226	0.11333
31	KM 6718 Violet	72.8	0.96	0.00810	0.03554	-0.04226	0.11333
32	KM 6718 D.Blue	72.8	0.59	0.03599	0.03554	-0.04226	0.11333
33	KM 6718 Grey	72.8	2.62	0.02995	0.03554	-0.04226	0.11333
34	KM 6718 Maroon	72.8	2.18	0.00000	0.03554	-0.04226	0.11333
35	KM 6718 Violet	72.8		0.00000	0.03554	-0.04226	0.11333
36	KM 6718 Yellow	72.8		0.02784	0.03554	-0.00872	0.07979
37	KM 6738 Brown	395.52	11.01	0.00268	0.03554	-0.00901	0.08008
38	KM 6738 Violet	387.84	1.04	0.00761	0.03554	-0.00901	0.08008
39	KM 6738 Black	387.84	2.95	0.01898	0.03554	-0.00727	0.07835
40	KM KLB 6738 Brown	436.8	6.69	0.04618	0.03554	-0.00727	0.07835
41	KM KLB 6738 Violet	436.8	18.37	0.05166	0.03554	-0.00704	0.07811
42	KM KLB 6738 Black	444.08	19.54	0.03051	0.03554	-0.01268	0.08375
43	KM 6737 Yellow	305.76	9.33	0.01249	0.03554	-0.01268	0.08375

Table 4.1. Data Reject Fabric Textile Type on December 2017 (Continue)

44	KM 6737 Maroon	305.76	3.82	0.00736	0.03554	-0.01268	0.08375
45	KM 6737 Grey	305.76	1.85	0.00657	0.03554	-0.01268	0.08375
46	KM 6737 Violet	305.76	1.61	0.00896	0.03554	-0.01268	0.08375
47	KM 6737 Blue	305.76	2.34	0.03392	0.03554	-0.01268	0.08375
48	KM 6743 Blue	305.76	8.97	0.00618	0.03554	-0.01268	0.08375
49	KM 6743 Black	305.76	1.29	0.01482	0.03554	-0.01268	0.08375
50	KM 6743 Yellow	305.76	2.93	0.02682	0.03554	-0.01268	0.08375
51	KM 6743 Maroon	305.76	7.8	0.01367	0.03554	-0.01268	0.08375
52	KM 6743 Brown	305.76	3.38	0.02268	0.03554	-0.00057	0.07165
53	TEX 6752 Black	728	15.11	0.00901	0.03554	-0.00057	0.07165
54	TEX 6752 Maroon	728	5.76	0.00677	0.03554	-0.00057	0.07165
55	TEX 6752 Brown	728	4.93	0.01199	0.03554	-0.00057	0.07165
56	KM 6746 Black	728	7.93	0.00294	0.03554	-0.00057	0.07165
57	KM 6746 Yellow	728	1.94	0.00391	0.03554	-0.00057	0.07165
58	KM 6746 Blue	728	2.25	0.03517	0.03554	-0.01058	0.08165
59	KM 6757 Blue	349.44	11.89	0.03140	0.03554	-0.00776	0.07883
60	KM 6757 Orange	422.24	12.66	0.09937	0.03554	-0.00996	0.08103
61	KM 6757 Violet	364	32.77	0.02347	0.03554	-0.01091	0.08198
62	KM 6757 Maroon	342.16	7.03	0.04306	0.03554	-0.01026	0.08134
63	KM 6757 Grey	356.72	13.36	0.03136	0.03554	-0.01058	0.08165
64	KM 6757 Fanta	349.44	8.36	0.02824	0.03554	-0.00996	0.08103
65	KM 6757 Yellow	364	9.08	0.10945	0.03554	-0.00996	0.08103
66	KM 6757 Tosca	364	33.04	0.03937	0.03554	-0.00996	0.08103
67	KM 6757 Turqish	364	13.93	0.0393681	0.03557	-0.00996	0.08103

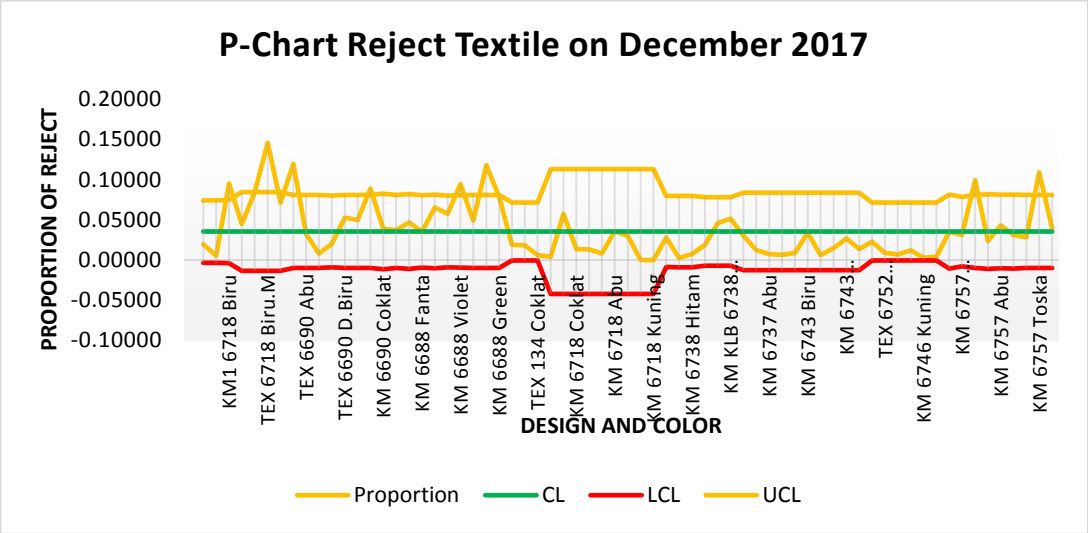

Figure 4.2. P-Chart Reject Type Textile Fabric on December 2017

Based on P-Chart, the production of textile fabric at December 2017, there are 8 data that still out of control, it means there are 8 product process to make the fabric is not expected. In 67 production times that run by production area and there are 7 not expected production process, it can conclude the production process is not good. When student made calculation in percentage, so how student will divided how many node was out of control and divided with how many number of production, so student will get the percentage defect is 11% in the one month production. Based in this result, it still include bad condition because the limitation is not accepted percentage defect because the limitation by this company is 10%. So, production department should concern with textile production process.

ii. Data and Analysis Data for Reject Fabric Cutting Type using P-Chart

From the data obtained, it will represented data about the number of production and the number of reject fabric. So the data analysis which can be done is to create a P-Chart as control chart for this problem.

Table 4.2. Data Reject Fabric Cutting Type on December 2017

Design	Production (pieces)	Reject (pieces)	Proportion	CL	LCL	UCL
KM 6725	960	21.5	0.02240	0.02064	-0.00697	0.048257
KM 6714	1091	54.5	0.04995	0.02064	-0.00582	0.047104
KM 6719	1120	42.5	0.03795	0.02064	-0.00559	0.046873

Table 4.2. Data Reject Fabric Cutting Type on December 2017 (Continue)

KM 6720	1200	0	0.00000	0.02064	-0.00499	0.046277
KM 6728	960	29	0.03021	0.02064	-0.00697	0.048257
KM 6698	960	10.5	0.01094	0.02064	-0.00697	0.048257
KM 6709	581	17	0.02926	0.02064	-0.01200	0.053289
KM 6691	1404	54.5	0.03882	0.02064	-0.00369	0.04497
KM 6709	1432	51.5	0.03596	0.02064	-0.00353	0.04481
KM 6733	1793	39.5	0.02203	0.02064	-0.00178	0.043065
KM 6727	1199	17.5	0.01460	0.02064	-0.00500	0.046284
KM 6730	1183	33.5	0.02832	0.02064	-0.00512	0.046399
KM 6745	1798	54.5	0.03031	0.02064	-0.00176	0.043045
KM 6617	600	9	0.01500	0.02064	-0.01166	0.05294
KM 6750	1098	21	0.01913	0.02064	-0.00576	0.047047
KM 6699	1075	14.5	0.01349	0.02064	-0.00595	0.047234
KM 6735	960	29	0.03021	0.02064	-0.00697	0.048257
KM 6698 (1)	2400	23.5	0.00010	0.02064	0.00030	0.040989
KM 6698 (2)	717	18.5	0.00026	0.02064	-0.00979	0.051078
KM 6698 (3)	1683	10	0.00006	0.02064	-0.00226	0.043544
KM 6685 (1)	2402	12	0.00005	0.02064	0.00030	0.040983
KM 6685 (2)	2400	27.5	0.00011	0.02064	0.00030	0.040989
KM 6685 (3)	851	28	0.00033	0.02064	-0.00810	0.049389
KM 6685 (4)	1551	29.5	0.00019	0.02064	-0.00289	0.044176
KM 6757	2402	12.5	0.00005	0.02064	0.00030	0.040983
KM 6447	454	15.5	0.00034	0.02064	-0.01480	0.056086
KM 6758	1799	43	0.00024	0.02064	-0.00176	0.04304
KM 6714	600	37.5	0.00063	0.02064	-0.01166	0.05294
Total	36673	757	0.01539			

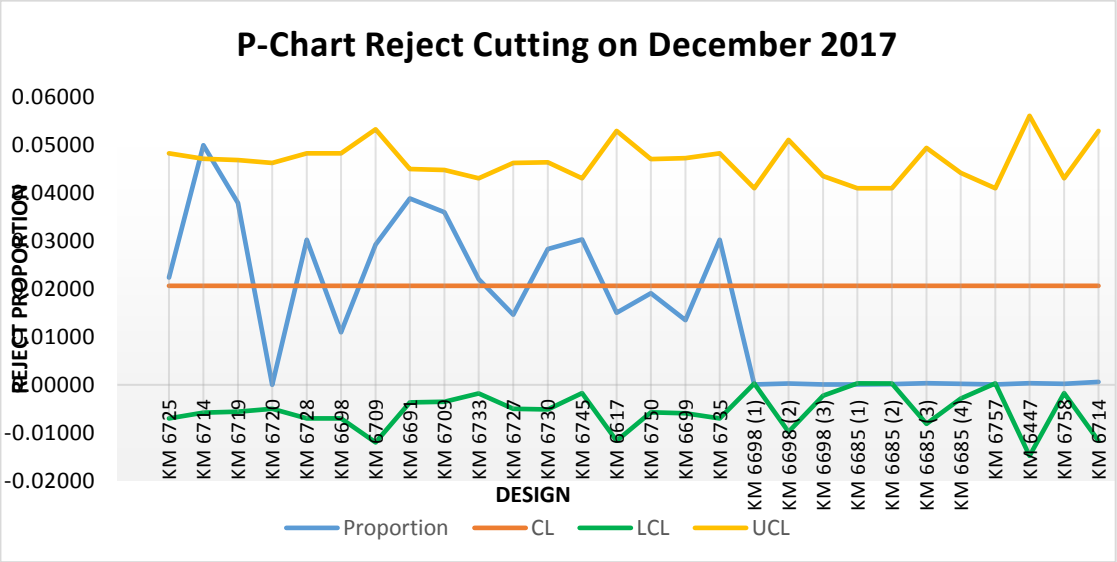

Figure 4.3. P-Chart Reject Type Cutting Fabric on December 2017

Based on P-Chart, the production of textile fabric at December 2017, there is only 1 data that still out of control, it can be conclude the production process in cutting fabric type is good. When student made calculation in percentage, so how student will divided how many node was out of control and divided with how many number of production, so student will get the percentage defect is 3% in the one month production. Based in this result, it still include good condition because the limitation still accepted percentage defect by this company is 10%.

iii. Data and Analysis Data for Reject Sarong and Hood Type

From the data obtained, it will represented data about the number of production and the number of reject fabric. So the data analysis which can be done is to create a P-Chart as control chart for this problem.

Table 4.3. Data Reject Fabric Sarong and Hood Type on December 2017

Design and Color	Model	Print (pieces)	Total Reject (pcs)	Proportion	CL	LCL	UCL
KM 6728 Dadu	Hood	570	27	0.04737	0.05840	0.01254	0.10427
KM 6728 Maroon	Hood	560	27	0.04821	0.05840	0.01227	0.10454
KM 6728 Brown	Hood	560	18	0.03214	0.05840	0.01227	0.10454
KM 6728 Blue	Hood	560	29	0.05179	0.05840	0.01227	0.10454
KM 6728 Violet	Hood	540	14	0.02593	0.05840	0.01170	0.10510
KM 6690 Yellow	Hood	480	28	0.05833	0.05840	0.00983	0.10697
KM 6690 Maroon	Hood	510	31	0.06078	0.05840	0.01081	0.10600

Table 4.3. Data Reject Fabric Sarong and Hood Type on December 2017(Continue)

KM 6690 Blue	Hood	480	87	0.18125	0.05840	0.00983	0.10697
KM 6718 Blue	Hood	540	25	0.04630	0.05840	0.01170	0.10510
KM 6718 Maroon	Hood	560	44	0.07857	0.05840	0.01227	0.10454
KM 6718 Yellow	Hood	520	12	0.02308	0.05840	0.01111	0.10569
KM 6725 Violet	Hood	590	62	0.10508	0.05840	0.01306	0.10374
KM 6725 Maroon	Hood	500	18	0.03600	0.05840	0.01049	0.10631
KM 6725 Brown	Hood	610	33	0.05410	0.05840	0.01356	0.10324
KM 6725 Dadu	Hood	530	31	0.05849	0.05840	0.01141	0.10539
KM 6725 Blue	Hood	560	41	0.07321	0.05840	0.01227	0.10454
KM 6735 Violet	Hood	690	57	0.08261	0.05840	0.01537	0.10144
KM 6735 Maroon	Hood	670	14	0.02090	0.05840	0.01494	0.10186
KM 6735 Blue	Hood	690	19	0.02754	0.05840	0.01537	0.10144
KM 6735 Yellow	Hood	650	37	0.05692	0.05840	0.01450	0.10230
KM 6735 Grey	Hood	660	76	0.11515	0.05840	0.01473	0.10208
KM 6569 Dadu	Hood	730	47	0.06438	0.05840	0.01617	0.10064
KM 6569 Maroon	Hood	720	72	0.10000	0.05840	0.01597	0.10083
KM 6569 Grey	Hood	720	35	0.04861	0.05840	0.01597	0.10083
KM 6569 Turqish	Hood	670	44	0.06567	0.05840	0.01494	0.10186
KM 6569 Yellow	Hood	670	18	0.02687	0.05840	0.01494	0.10186
FH 50 Dadu	Hood	680	46	0.06765	0.05840	0.01516	0.10165
FH 50 Maroon	Hood	640	39	0.06094	0.05840	0.01428	0.10253
FH 50 Blue	Hood	650	34	0.05231	0.05840	0.01450	0.10230
FH 50 Green	Hood	690	23	0.03333	0.05840	0.01537	0.10144
FH 50 Brown	Hood	630	24	0.03810	0.05840	0.01404	0.10276
KM 6741 Dadu	Hood	640	30	0.04688	0.05840	0.01428	0.10253
KM 6741 Maroon	Hood	1110	29	0.02613	0.05840	0.02167	0.09513
KM 6741 Yellow	Hood	1130	27	0.02389	0.05840	0.02189	0.09491
KM 6741 Turqish	Hood	1120	80	0.07143	0.05840	0.02178	0.09502
KM 6741 Grey	Hood	640	38	0.05938	0.05840	0.01428	0.10253
KM 6736 Yellow	Hood	820	28	0.03415	0.05840	0.01777	0.09903
KM 6736 Maroon	Hood	850	29	0.03412	0.05840	0.01826	0.09855
KM 6736 Turqish	Hood	850	45	0.05294	0.05840	0.01826	0.09855
KM 6736 Dadu	Hood	410	10	0.02439	0.05840	0.00721	0.10959
KM 6736 Grey	Hood	400	21	0.05250	0.05840	0.00679	0.11001
KM 6040 Maroon	Hood	600	110	0.18333	0.05840	0.01332	0.10349
KM 6040 Blue	Hood	570	29	0.05088	0.05840	0.01254	0.10427
KM 6040 Yellow	Hood	600	30	0.05000	0.05840	0.01332	0.10349
KM 6730 Maroon	Hood	520	39	0.07500	0.05840	0.01111	0.10569
KM 6730 Turqish	Hood	530	35	0.06604	0.05840	0.01141	0.10539
KM 6730 Yellow	Hood	580	24	0.04138	0.05840	0.01280	0.10400

Table 4.3. Data Reject Fabric Sarong and Hood Type on December 2017(Continue)

TEX 874 Black	Hood	710	12	0.01690	0.05840	0.01578	0.10103
TEX 874 Maroon	Hood	680	15	0.02206	0.05840	0.01516	0.10165
TEX 874 Violet	Hood	680	20	0.02941	0.05840	0.01516	0.10165
FH 144 Maroon	Hood	830	41	0.04940	0.05840	0.01794	0.09887
FH 144 Black	Hood	790	58	0.07342	0.05840	0.01727	0.09954
FH 144 Coffee	Hood	830	63	0.07590	0.05840	0.01794	0.09887
FH 144 Olive	Hood	810	35	0.04321	0.05840	0.01761	0.09920
FH 144 Brown	Hood	800	63	0.07875	0.05840	0.01744	0.09937
KM 6716 Yellow	Hood	470	18	0.03830	0.05840	0.00949	0.10731
KM 6716 Turqish	Hood	420	46	0.10952	0.05840	0.00762	0.10918
KM 6716 Maroon	Hood	500	33	0.06600	0.05840	0.01049	0.10631
KM 6722 Yellow	Hood	1210	48	0.03967	0.05840	0.02272	0.09409
KM 6722 Maroon	Hood	1620	83	0.05123	0.05840	0.02602	0.09078
KM 6722 Brown	Hood	790	58	0.07342	0.05840	0.01727	0.09954
KM 6722 Dadu	Hood	1130	68	0.06018	0.05840	0.02189	0.09491
KM 6722 Blue	Hood	1600	97	0.06063	0.05840	0.02589	0.09092
KM 6740 Dadu	Hood	590	66	0.11186	0.05840	0.01306	0.10374
KM 6740 Maroon	Hood	600	47	0.07833	0.05840	0.01332	0.10349
KM 6740 Grey	Hood	630	44	0.06984	0.05840	0.01404	0.10276
KM 6740 Turqish	Hood	590	60	0.10169	0.05840	0.01306	0.10374
KM 6740 Yellow	Hood	620	42	0.06774	0.05840	0.01381	0.10300
KM 6699 Maroon	Hood	510	45	0.08824	0.05840	0.01081	0.10600
KM 6699 Dadu	Hood	530	61	0.11509	0.05840	0.01141	0.10539
KM 6699 Yellow	Hood	450	14	0.03111	0.05840	0.00878	0.10803
KM 6699 Turqish	Hood	520	46	0.08846	0.05840	0.01111	0.10569
KM 6698 Violet	Hood	1110	31	0.02793	0.05840	0.02167	0.09513
KM 6698 Dadu	Hood	1120	41	0.03661	0.05840	0.02178	0.09502
KM 6698 Blue	Hood	1080	74	0.06852	0.05840	0.02134	0.09547
KM 6698 Maroon	Hood	1090	36	0.03303	0.05840	0.02145	0.09535
KM 6698 Brown	Hood	1090	28	0.02569	0.05840	0.02145	0.09535
FH 166 Maroon	Sarong	870	120	0.13793	0.05840	0.01857	0.09824
FH 166 Brown	Sarong	850	31	0.03647	0.05840	0.01826	0.09855
FH 166 Green	Sarong	870	46	0.05287	0.05840	0.01857	0.09824
FH 166 Olive	Sarong	880	30	0.03409	0.05840	0.01872	0.09809
FH 166 Yellow	Sarong	850	34	0.04000	0.05840	0.01826	0.09855
KM 6730 Dadu	Sarong	850	84	0.09882	0.05840	0.01826	0.09855
KM 6730 Violet	Sarong	420	21	0.05000	0.05840	0.00762	0.10918
KM 6730 Blue	Sarong	840	101	0.12024	0.05840	0.01810	0.09871
KM 6730 Maroon	Sarong	820	49	0.05976	0.05840	0.01777	0.09903
KM 6730 Brown	Sarong	790	38	0.04810	0.05840	0.01727	0.09954

Table 4.3. Data Reject Fabric Sarong and Hood Type on December 2017(Continue)

KM 6749 Yellow	Hood	600	48	0.08000	0.05840	0.01332	0.10349
KM 6749 Dadu	Hood	610	56	0.09180	0.05840	0.01356	0.10324
KM 6749 Maroon	Hood	630	49	0.07778	0.05840	0.01404	0.10276
KM 6749 Turqish	Hood	630	31	0.04921	0.05840	0.01404	0.10276
KM 6749 Grey	Hood	640	49	0.07656	0.05840	0.01428	0.10253
KM 6750 Dadu	Hood	620	38	0.06129	0.05840	0.01381	0.10300
KM 6750 Yellow	Hood	630	18	0.02857	0.05840	0.01404	0.10276
KM 6750 Maroon	Hood	600	22	0.03667	0.05840	0.01332	0.10349
KM 6750 Turqish	Hood	610	16	0.02623	0.05840	0.01356	0.10324
KM 6750 Grey	Hood	640	31	0.04844	0.05840	0.01428	0.10253
Total		68850	4021	5.82100			

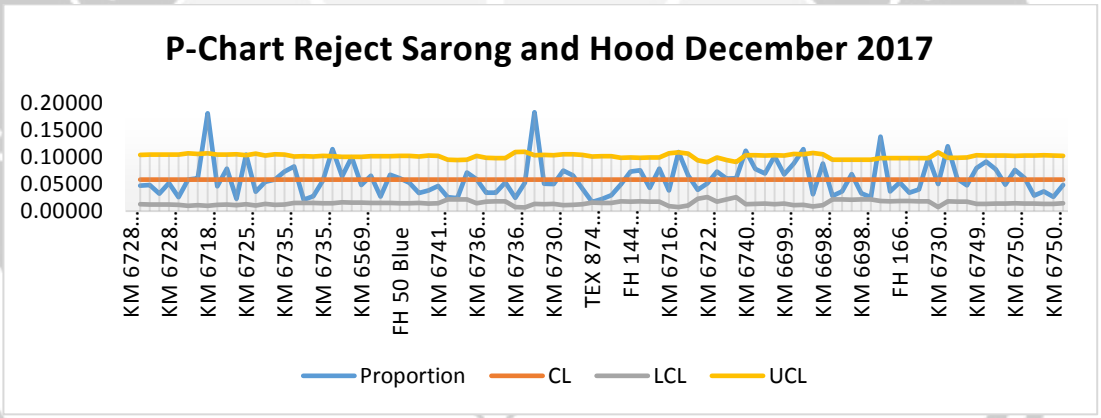

Figure 4.4. P-Chart Reject Type Sarong and Hood Fabric on December 2017

Based on P-Chart, the production of sarong and hood fabric at December 2017, there are 8 data that still out of control, it means there are 8 product process to make the sarong and hood is still not expected. In 96 production times that run by production area and there are 8 not expected production process When student made calculation in percentage, so how student will divided how many node was out of control and divided with how many number of production, so student will get the percentage defect is 8% in the one month production. Based in this result, Based in this result, it still include good condition because the limitation still accepted percentage defect by this company is 10%.

iv. Data and Analysis Data for Roll Fabric Type using P-Chart

From the data obtained, it will represented data about the number of production and the number of reject fabric. So the data analysis which can be done is to create a P-Chart as control chart for this problem.

Table 4.4. Data Reject Fabric Roll Type on December 2017

No	Design	Actual (m)	Total Reject (m)	Proportion	CL	LCL	UCL
1	Tex 134 Red	1067.26	6	0.00562	0.03162	0.00101	0.06223
2	Tex 134 Blue	1203.15	14	0.01164	0.03162	0.00221	0.06104
3	Tex 134 Brown	1174.57	0	0.00000	0.03162	0.00197	0.06127
4	KM 6690 Violet	2377.72	0	0.00000	0.03162	0.00818	0.05506
5	KM 6690 Grey	3552.29	0	0.00000	0.03162	0.01112	0.05212
6	KM 6690 L.Blue	585.27	7	0.01196	0.03162	-0.00578	0.06902
7	KM 6690 Brown	534.4	28	0.05240	0.03162	-0.00693	0.07017
8	KM 6690 Fanta	575.45	35	0.06082	0.03162	-0.00599	0.06923
9	KM 6690 Red	1946.56	47	0.02415	0.03162	0.00656	0.05668
10	KM 6690 D.Blue	2157.64	29	0.01344	0.03162	0.00741	0.05583
11	KM 6690 Yellow	1917.54	80	0.04172	0.03162	0.00644	0.05680
12	KM 6690 Green	667.78	67	0.10033	0.03162	-0.00417	0.06741
13	Tex 100 Maroon	1383.04	28	0.02025	0.03162	0.00354	0.05970
14	Tex 100 Brown	1344.9	9	0.00669	0.03162	0.00328	0.05996
15	KM 6709 Red	868.3	101	0.11632	0.03162	-0.00117	0.06441
16	KM 6709 Yellow	980.24	55	0.05611	0.03162	0.00013	0.06311
17	KM 6709 Maroon	1427.95	11	0.00770	0.03162	0.00384	0.05940
18	KM 6709 Blue	1027.79	102	0.09924	0.03162	0.00062	0.06262
19	KMh 6688 Fanta	595.95	48	0.08054	0.03162	-0.00556	0.06880
20	KMh 6688 Yellow	646.19	29	0.04488	0.03162	-0.00457	0.06781
21	KMh 6688 Red	654.73	70	0.10691	0.03162	-0.00441	0.06765
22	KMh 6688 Brown	659.48	33	0.05004	0.03162	-0.00432	0.06756
23	KMh 6688 Violet	646.34	31	0.04796	0.03162	-0.00456	0.06780
24	KMh 6688 Green	516.61	27	0.05226	0.03162	-0.00737	0.07061
25	KMh 6688 N.Green	544.1	8	0.01470	0.03162	-0.00670	0.06994
26	KMh 6688 L.Blue	522.29	22	0.04212	0.03162	-0.00723	0.07047
27	KM 6738 Violet	1198.47	74	0.06175	0.03162	0.00217	0.06107
28	KM 6738 Black	1238.55	19	0.01534	0.03162	0.00249	0.06075
29	KM 6738 Brown	1296.39	37	0.02854	0.03162	0.00293	0.06031
30	KM 6738 Maroon	1200.32	17	0.01416	0.03162	0.00218	0.06106
31	KM 6743 Black	1276.86	0	0.00000	0.03162	0.00278	0.06046
32	KM 6743 Yellow	1130.39	41	0.03627	0.03162	0.00159	0.06165

Table 4.4. Data Reject Fabric Roll Type on December 2017 (continue)

33	KM 6743 Maroon	1216.09	39	0.03207	0.03162	0.00231	0.06093
34	KM 6743 Blue	1220.84	37	0.03031	0.03162	0.00235	0.06089
35	KM 6742 Brown	849.65	3	0.00353	0.03162	-0.00141	0.06465
36	KM 6742 Red	918.67	29	0.03157	0.03162	-0.00056	0.06380
37	KM 6742 Violet	865.52	5	0.00578	0.03162	-0.00121	0.06445
38	KM 6742 Yellow	918.68	6	0.00653	0.03162	-0.00056	0.06380
39	KM 6742 Blue	874.84	10	0.01143	0.03162	-0.00109	0.06433
40	KMh 6743 Maroon	1163.33	11	0.00946	0.03162	0.00187	0.06137
41	KMh 6743 Yellow	1145.85	47	0.04102	0.03162	0.00172	0.06152
42	KMh 6743 Blue	1207.25	3	0.00248	0.03162	0.00224	0.06100
43	KMh 6743 Brown	1201.98	26	0.02163	0.03162	0.00220	0.06105
44	KMh 6743 Black	1208.88	20	0.01654	0.03162	0.00225	0.06099
45	KM 6688 D.Blue	655.42	27	0.04119	0.03162	-0.00440	0.06764
46	KM 6688 L.Blue	579.19	14	0.02417	0.03162	-0.00591	0.06915
47	KM 6688 Maroon	575.08	14	0.02434	0.03162	-0.00600	0.06924
48	KM 6688 Fanta	571.64	26	0.04548	0.03162	-0.00608	0.06932
49	KM 6688 Violet	585.53	17	0.02903	0.03162	-0.00578	0.06902
50	KM 6688 Green	581.05	53	0.09121	0.03162	-0.00587	0.06911
51	KM2 6690 Green	1098.09	67	0.06102	0.03162	0.00130	0.06195
52	KM2 6690 Violet	1123.32	34	0.03027	0.03162	0.00153	0.06172
53	KM2 6690 Fanta	1084.13	20	0.01845	0.03162	0.00117	0.06207
54	KM2 6690 Maroon	1101.35	27	0.02452	0.03162	0.00133	0.06192
55	KM2 6690 D.Blue	1011.99	109	0.10771	0.03162	0.00046	0.06278
56	KM2 6690 L.Blue	1128.3	35	0.03102	0.03162	0.00157	0.06167
57	KM 6737 Maroon	1389.87	14	0.01007	0.03162	0.00359	0.05965
58	KM 6737 Blue	1316.93	16	0.01215	0.03162	0.00308	0.06016
59	KM 6737 Yellow	1304.59	16	0.01226	0.03162	0.00299	0.06025
60	KM 6737 Grey	1298.56	8	0.00616	0.03162	0.00294	0.06030
61	KM 6737 Violet	1323.25	40	0.03023	0.03162	0.00312	0.06012
62	KMh 6738 Black	1154.75	10	0.00866	0.03162	0.00180	0.06144
63	KMh 6738 Violet	1100.36	7	0.00636	0.03162	0.00132	0.06192
64	KMh 6737 Red	1202	38	0.03161	0.03162	0.00220	0.06104
65	KMh 6737 Blue	1205	87	0.07220	0.03162	0.00222	0.06102
66	KMh 6737 Violet	1227.36	31	0.02526	0.03162	0.00240	0.06084
67	KMh 6737 Yellow	1170.88	13	0.01110	0.03162	0.00194	0.06130
68	KMh 6737 Grey	1236.24	10	0.00809	0.03162	0.00247	0.06077
69	KM2 6742 Red	1295.4	19	0.01467	0.03162	0.00292	0.06032
70	KM2 6742 Violet	1363.22	9	0.00660	0.03162	0.00341	0.05984
71	KM2 6742 Blue	1344.64	1	0.00074	0.03162	0.00328	0.05997

Table 4.4. Data Reject Fabric Roll Type on December 2017 (continue)

72	KMh 6742 Yellow	691.11	33	0.04775	0.03162	-0.00376	0.06701
73	KMh 6742 Brown	717.19	3	0.00418	0.03162	-0.00333	0.06657
74	KMh 6742 Violet	1732.11	35	0.02021	0.03162	0.00557	0.05767
75	KMh 6742 Blue	1786.98	56	0.03134	0.03162	0.00584	0.05740
76	KMh 6742 Maroon	1746.46	802	0.45921	0.03162	0.00564	0.05760
77	KM 6752 Red	1414.86	13	0.00919	0.03162	0.00375	0.05949
78	KM 6752 Brown	1300.13	14	0.01077	0.03162	0.00296	0.06029
79	KM 6752 Black	1342.57	34	0.02532	0.03162	0.00326	0.05998
80	KM 6746 Black	1268	25	0.01972	0.03162	0.00272	0.06053
81	KM 6746 Blue	1160.72	1	0.00086	0.03162	0.00185	0.06139
82	KM 6746 Yellow	1167.67	18	0.01542	0.03162	0.00191	0.06133
83	KMh 6746 Black	1140.64	24	0.02104	0.03162	0.00168	0.06156
84	KMh 6746 Blue	1092.8	19	0.01739	0.03162	0.00125	0.06199
85	KMh 6746 Yellow	1122.76	14	0.01247	0.03162	0.00152	0.06172
86	KM 6757 Red	633.28	28	0.04421	0.03162	-0.00481	0.06805
87	KM 6757 Yellow	661.42	11	0.01663	0.03162	-0.00429	0.06753
88	KM 6757 Orange	784.46	7	0.00892	0.03162	-0.00230	0.06554
89	KM 6757 Blue	648.21	37	0.05708	0.03162	-0.00453	0.06777
90	KM 6757 Grey	643.1	12	0.01866	0.03162	-0.00462	0.06787
91	KMh 6752 Red	1119.3	0	0.00000	0.03162	0.00149	0.06175
92	KMh 6752 Black	1087.54	11	0.01011	0.03162	0.00120	0.06204
93	KMh 6752 Brown	1170.06	0	0.00000	0.03162	0.00193	0.06131
94	KM 6757 Violet	665.93	38	0.05706	0.03162	-0.00421	0.06745
95	KM 6757 Turqis	686.45	7	0.01020	0.03162	-0.00384	0.06709
96	KM 6757 Tosca	757.05	14	0.01849	0.03162	-0.00271	0.06595
Total		105279	3329	3.15705			

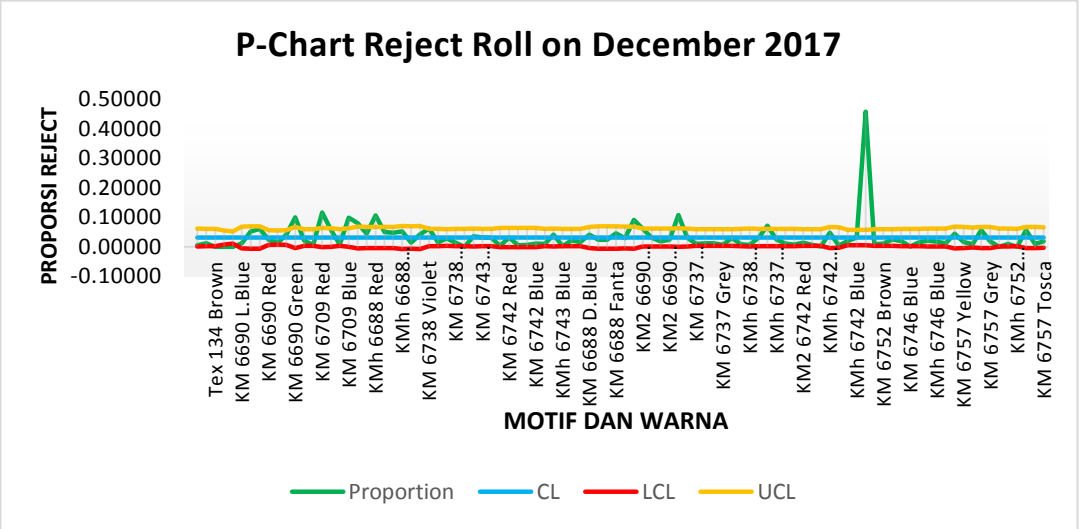

Figure 4.5. P-Chart Reject Type Roll Fabric on December 2017

Based on P-Chart, the production of roll fabric at December 2017, there are 7 data that still out of control, it means there are 7 production process to make roll fabric is still not expected. In 96 production times that run by production area and there are 7 not expected production process. When student made calculation in percentage, so how student will divided how many node was out of control and divided with how many number of production, so student will get the percentage defect is 7% in the one month production. Based in this result, Based in this result, it still include good condition because the limitation still accepted percentage defect by this company is 10%.

b. Analysis Data using Pareto chart

Based on information about number of every types of reject in finished product (woman apparel), roll fabric type also sarong and hood fabric type so student can analyze by using Pareto chart to know what kind of types of reject that often occurred in every production process. In Pareto chart student will cumulate the number of reject in every types of reject and make a histogram to know and see the distribution of the data.

i. Pareto Chart of Reject Finished Product

Based on the data about frequency of defect that found on finished product, this figure will be show the Pareto chart of finished product.

Table 4.5. Cumulative Frequency Reject Types of Finished Product on December 2017

Type of Reject	Number of Reject	Percentage (%)
Pierced	127	49.42
Stain	47	18.29
Fabric	31	12.06
Lack of fabric	23	8.95
Production process	11	4.28
Unbalance	6	2.33
Boing	6	2.33
Stripped	3	1.17
Wrong Size	3	1.17
Total Production	257	100

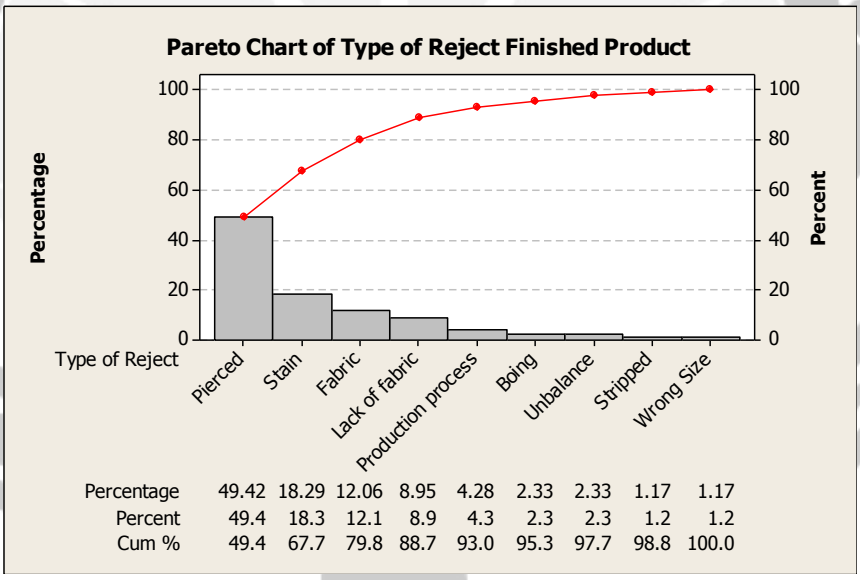

Figure 4.6.Pareto Chart Type of Reject Finished Product on December 2017

Based on Pareto chart, type of reject that most found was pierced. Then other reject types are stain, fabric, lack of fabric when CMT would sew the product, production process, boing, unbalanced, stripped and wrong size chart.

ii. Pareto Chart of Reject Roll

Based on the data about frequency of defect that found on roll batik garment, this figure will be show the Pareto chart.

Table 4.6. Cumulative Frequency Reject Types of Roll Fabric on December 2017

Type of Reject	Total Reject	Percentage (%)
A	1230	38.1
E	16	23.5
C	747	23.1
G	9	17.2
B	760	0.5
D	7	0.3
F	555	0.2
H	5	0.2
Total	3329	100

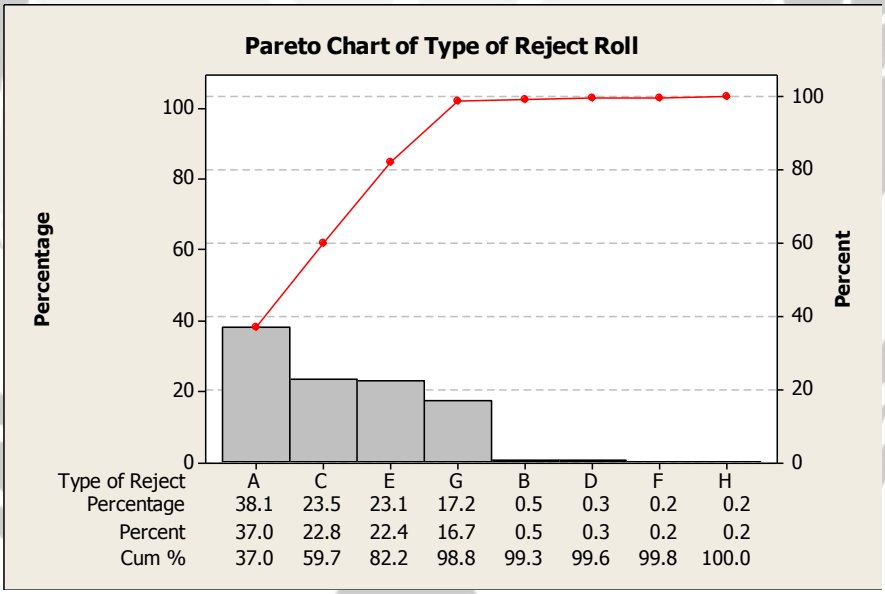

Figure 4.7.Pareto Chart Reject Types of Roll Fabric on December 2017

Table 4.7. Description Types of Reject

A: Stain	E: Repeat Striped
B: Spotted	F: Fabric Striped
C: Exlip	G: Process Pierced
D: Overleaping	H: Grey Fabric Pierced

Based on Pareto chart, type of reject that most found was stain. Then other reject types are exlip, repeat striped, process striped, spotted, overleaping, fabric striped and grey fabric pierced.

iii. Pareto Chart of Reject Sarong and Hood

Based on the data about frequency of defect that found on sarong and hood, this figure will be show the Pareto chart.

Table 4.8. Frequency Reject Types of Sarong and Hood Fabric on December 2017

Type of Reject	Percentage (%)
Break Defect	52.15
Ripped from machine	27.98
Stain	17.63
NEPS	1.32
Others	0.92

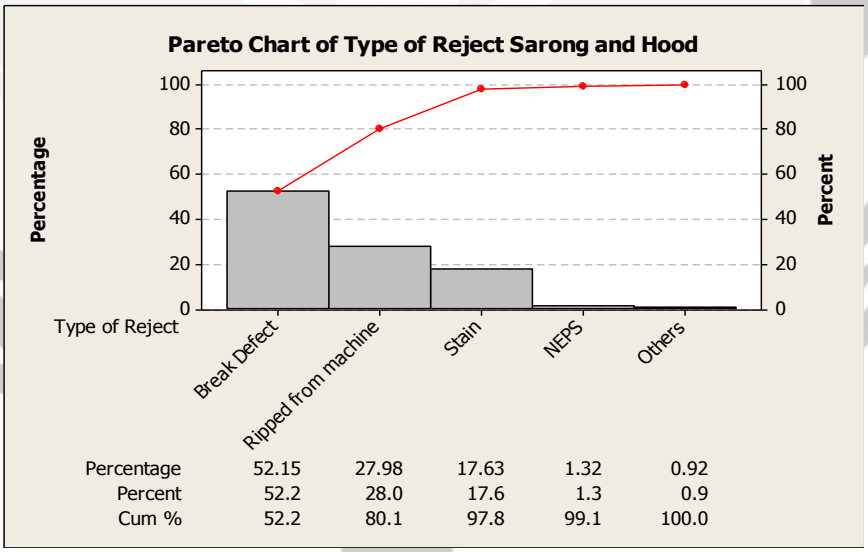

Figure 4.8.Pareto Chart Reject Types Sarong and Hood Fabric on December 2017

Based on Pareto chart, type of reject that most found was break defect. Then other reject types are ripped from machine, stain, NEPS and others.

c. Analysis type of reject using Cause-Effect Diagram

Cause-Effect diagram is one of seven tools in Quality Control. Cause-Effect diagram will analyze the root in some overviews like personnel, material, machine, method and environment of every problem and what every elements can affect the problem was occurred. Cause-Effect Diagram Type of Reject at PT. Hadiputra Gemilang on December 2017 concludes based on the frequency of defect type on the Pareto chart which often found. Because there are so many types of reject that found and uncomplete information types of reject like in cutting product and textile product, that not provided what kind reject types was found, so student try to generate reject types based on Pareto chart and interview with operators which conducted the process. Generation type of defect was based on consideration that those kind type of defect was found in every product type. This result about generate type of defect which conduct by student also had been approved by head of production.

i. Analysis Data using Cause-Effect Diagram Reject Type Exlip

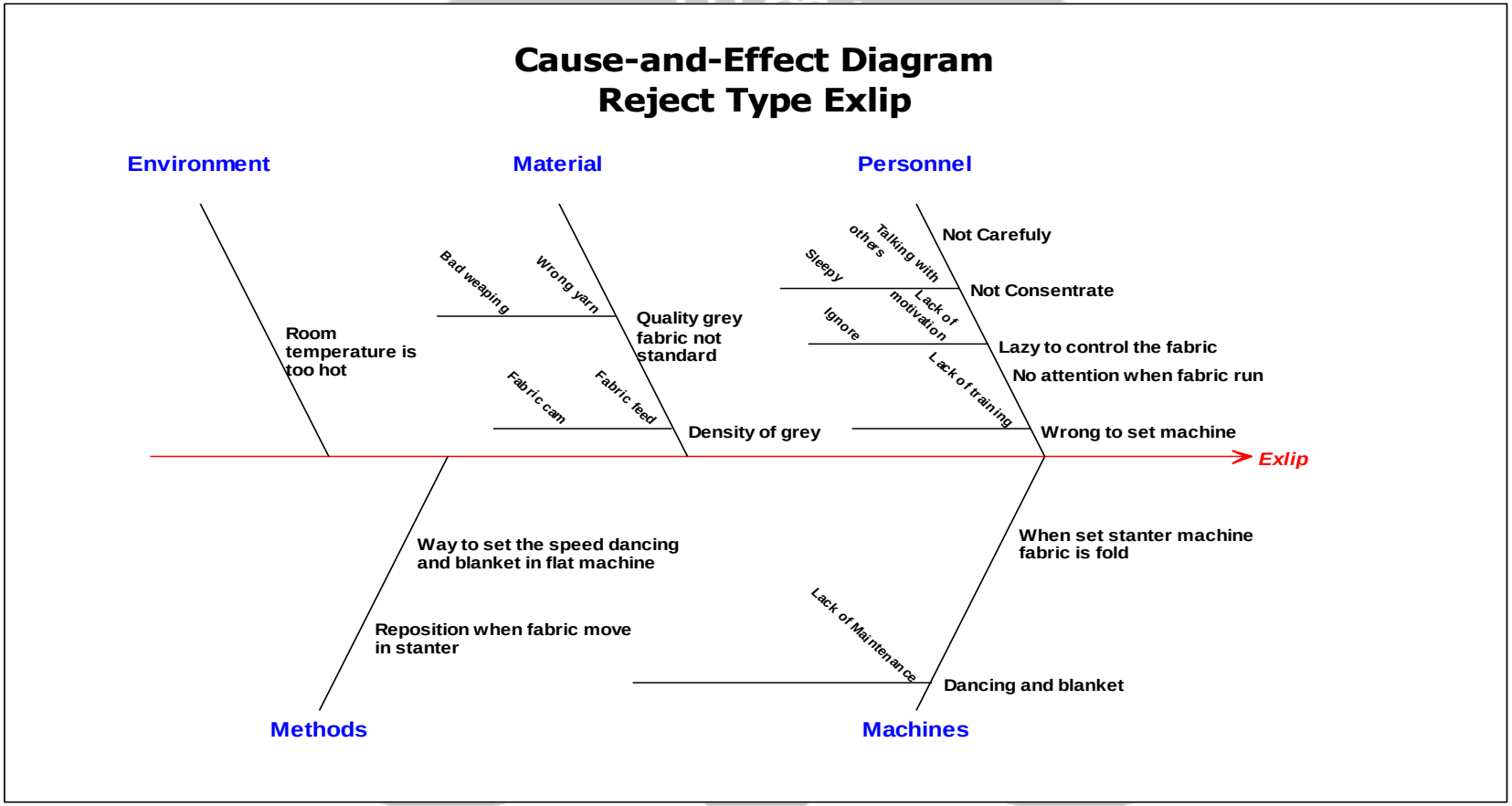

Figure 4.9. Cause Effect Diagram Reject Type Exlip

ii. Analysis Data using Cause-Effect Diagram Reject Type Stripped and Repeat Stripped

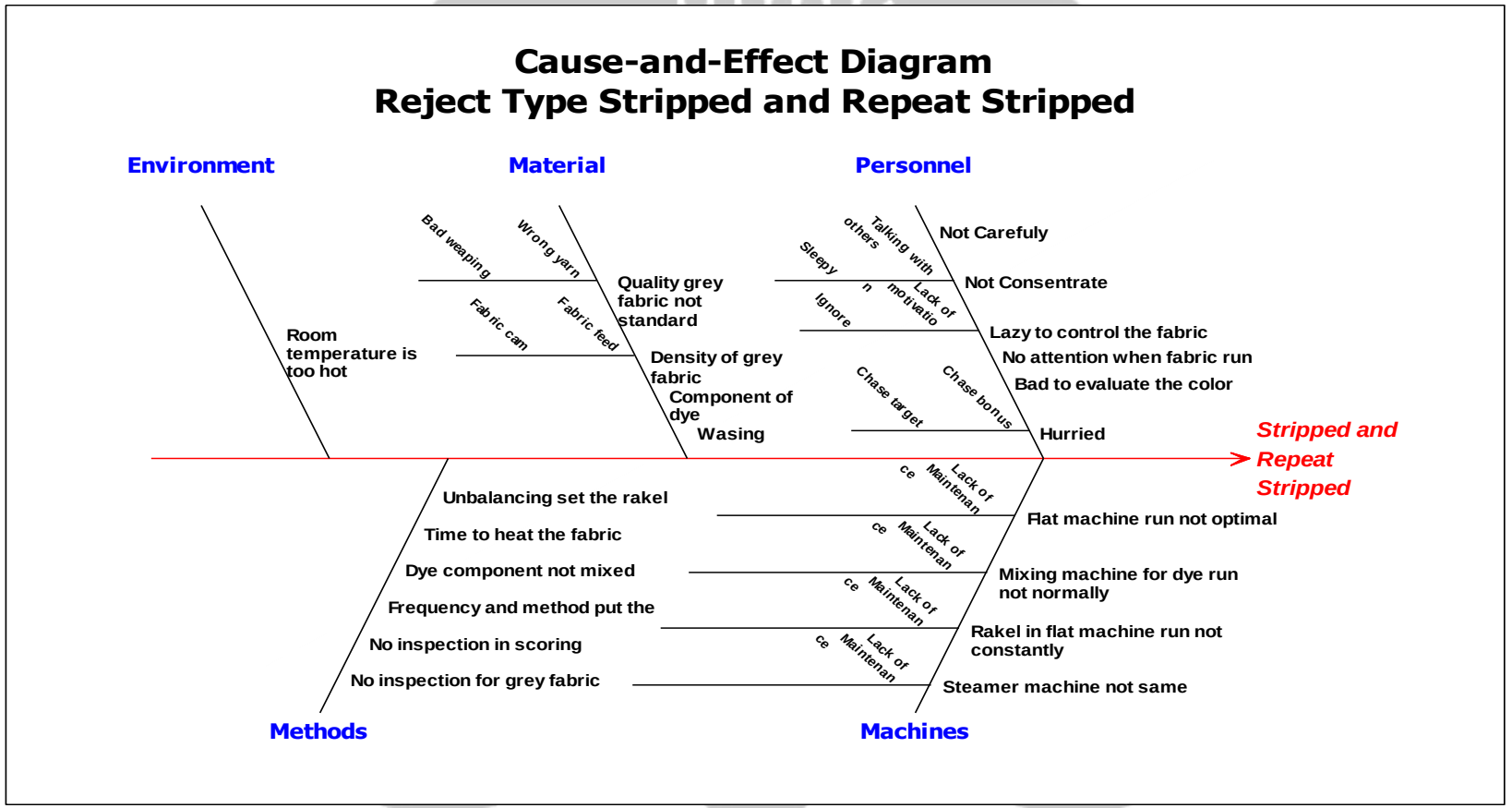

Figure 4.10. Cause-Effect Diagram Reject Type Stripped and Repeat Stripped

iii. Analysis Data using Cause-Effect Diagram Reject Type Repeat Stain and Spotted

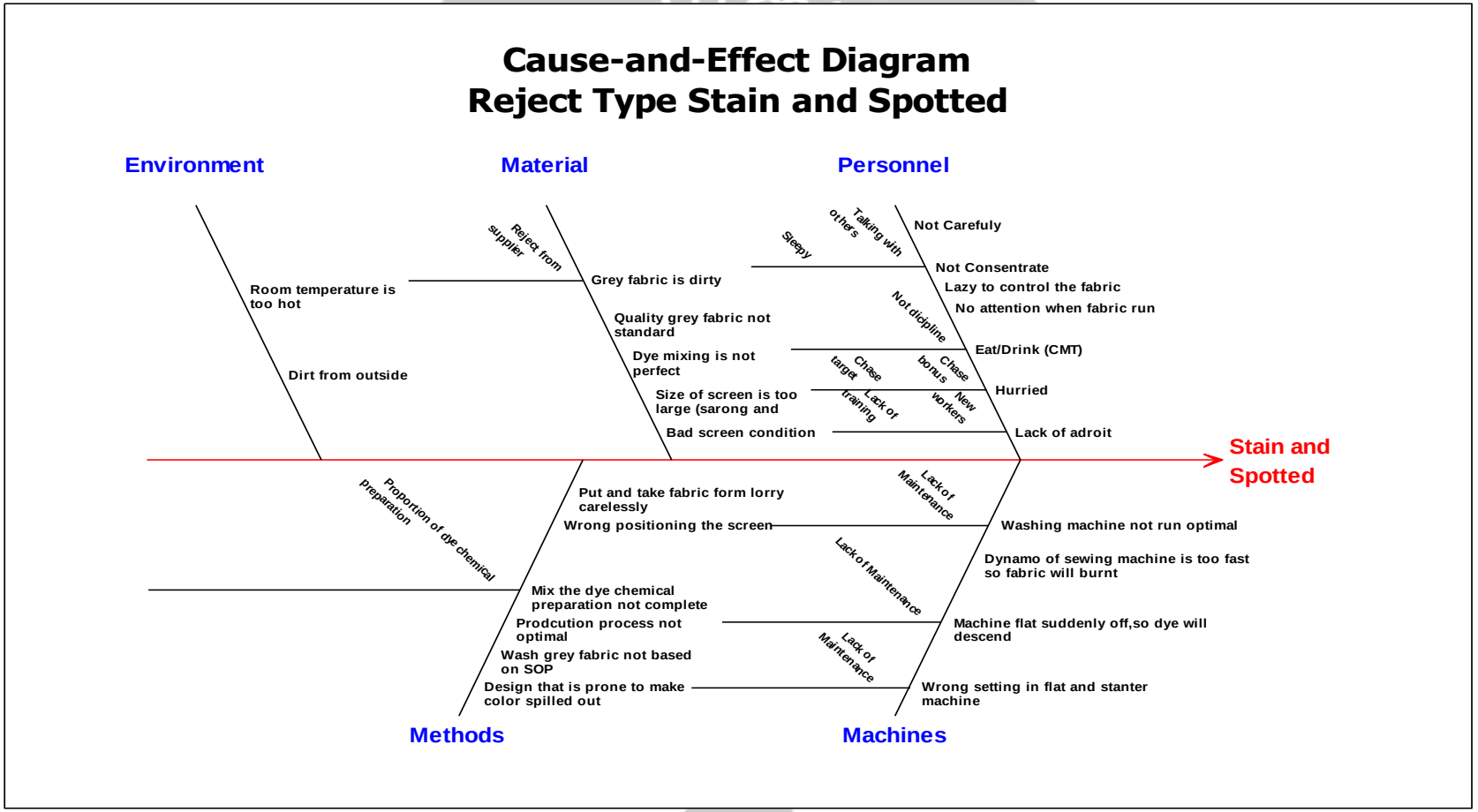

Figure 4.11. Cause-Effect Diagram Reject Type Stain and Repeat Spotted

iv. Analysis Data using Cause-Effect Diagram Reject Type Ripped and Pierced

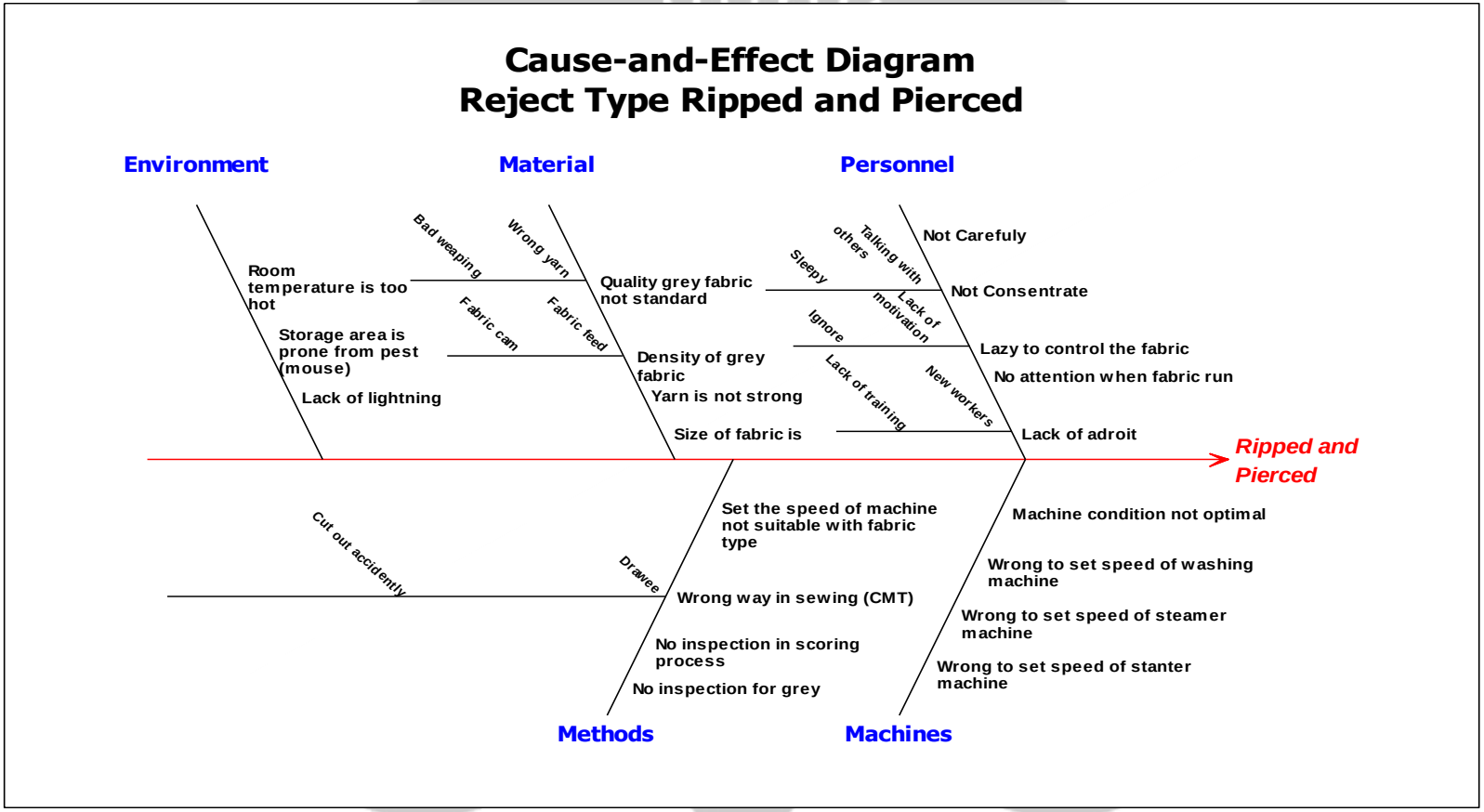

Figure 4.12. Cause-Effect Diagram Reject Type Ripped and Pierced

v. Analysis Data using Cause-Effect Diagram Reject Type Overleap and Boeing

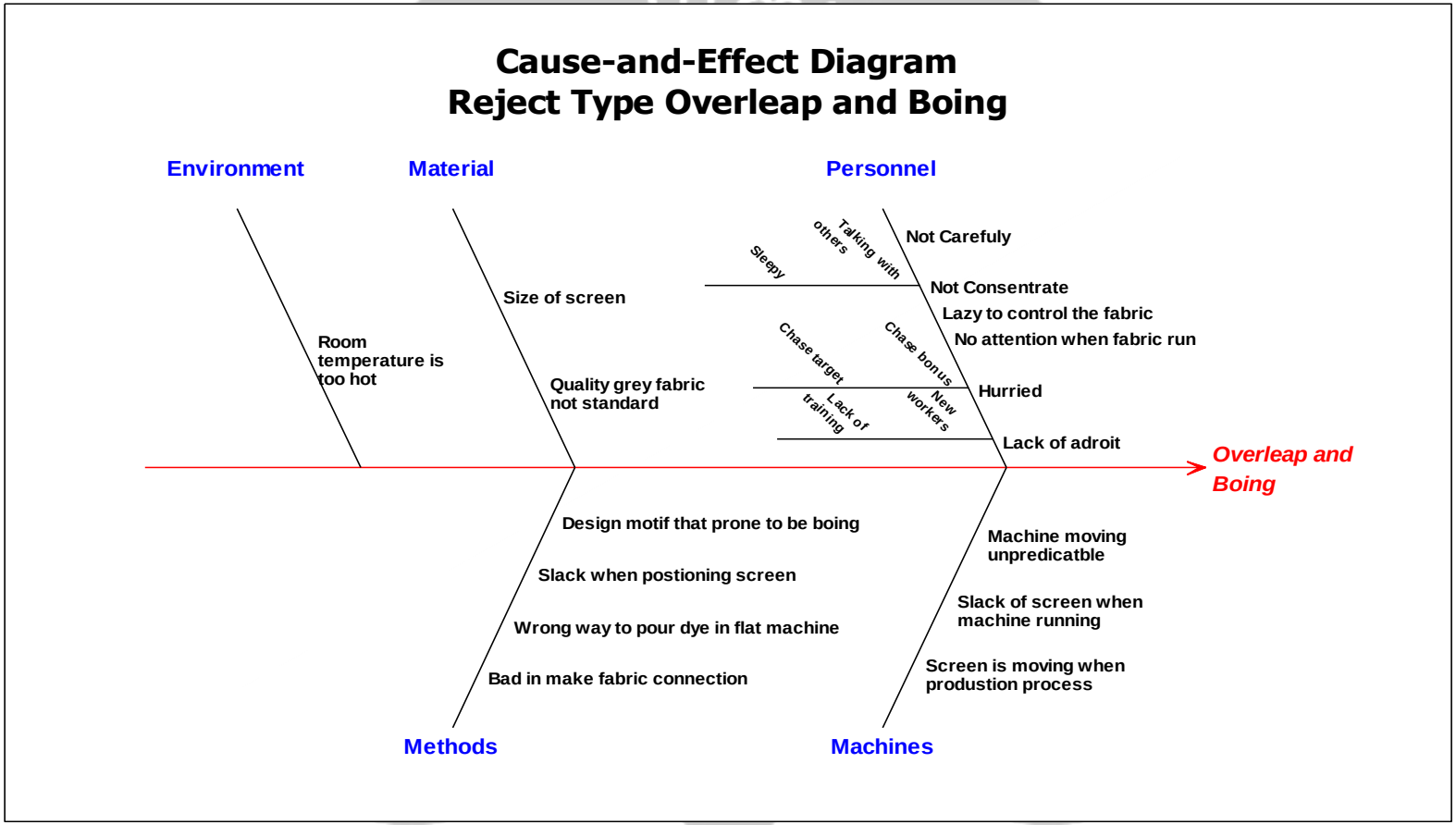

Figure 4.13. Cause-Effect Diagram Reject Type Overleap and Boing

d. Analysis type of reject and suggestion based on Cause-Effect Diagram

i. Man or Personnel

Based on the result of cause-effect diagram that performed almost all of type reject is mostly caused by human error. This condition occur because who run the machine and who run the production method is human. Based on the 5 types of reject that mostly occurred in fabric production at PT. Hadiputra Gemilang those are the problem that perform by human:

a) Not carefully

b) Not concentrate

This problem happened because sometimes because the human was sleepy when they worked and sometimes they talked with other workers when they run the production process. This problem can make they not pay full attention with the fabric production so it would be some missed reject fabric that not seen by the workers and be allowed to get through to continue to the next process.

c) Lazy to control the fabric

This problem happened because the worker tried to ignore their job and just let the fabric run continuously without any attention and control. Mostly reason from the worker why they lazy to check because they had lack of motivation. They just worked commonly and didn't have a passion to give the best work for the company.

d) No attention when the fabric run

The worker just let the fabric flow at the machine without control them.

e) Lack of adroit

In some case the worker was lack of adroit. This problem occurred because some of them got lack of training from the head of shift and some case happened because they are still a new worker that had lack of experience in production system.

f) Hurried

This is also a big problem in this company as a reason why the worker can't perform their best work for the company. Most of the workers in this company was hurried when they worked because they chase the target to get the bonus payment. Because when they can reached the target the will get full payment also when they could produce more than target was given they would get the bonus

based on how much they could produce more. This kind of problem was make the company confused how to implement the wage system to their workers.

g) Not discipline

This problem was occurred in CMT area, many of workers they ate and drank in the area and time in production.

Based on the problem that occurred these are some suggestion for the company:

a) Give special gathering and training for the workers

To make the workers get more motivation is better for the company to make special training and gathering for the workers especially production workers because reject is mostly come for the production process. This gathering and training used for the workers to refresh themselves over the daily production day and also can be know their friends much more rather just become as work partner at the company. This gathering maybe can has sharing session for the workers and can be the best way for the head of production to train, try to change their mindset about working effort is not about money and bonus because most of the operators in this company have low of education background and try to motivate them to work better because their role in this company are very important to make the company become a success and best company. It can make maybe once in three months to make evaluation for the workers and it can separated based on the division at the production area. And also company can make achievement for the best workers every month and give them bonus to make them more motivated.

b) Give punishment

It can be alternative for the company to make the worker give their best performances at their work. Give punishment by cut their wage if their fault when make the fabric is more than tolerance. Now, this company already implement the punishment but the punishment haven't make the worker pay attention with it. Because the punishment system is they just give scorching the worker for 3 days. It's mean they lose their worker 3 days and not give any impact for the workers because they not work for the company and they not get the money and it's fear for the workers, they not tired for 3 days. So it will better, the workers still come to work but cut their wage based on their fault, so it can make the worker think that they must give the best work in order to get maximum payment each day.

j. Material

Based on the problem about five types reject for fabric production, the material also as a cause that make the reject for the production.

a) Quality of fabric

The main material that mostly become cause is quality of grey fabric. The quality of grey fabric we can control it because it just product from the supplier. Supplier often make mistake with the NEPS, NEPS is they put the different type of yarn when the weaving process so when the grey fabric already printing the color will be different because the dye at PT. Hadiputra Gemilang they choose the dye especially fit the rayon yarn so when the other yarn is weaving it will make different color of printing and it will be reject product.

b) Density of fabric

Density of fabric also as the problem in the material. Because when the fabric cam and fabric feed are not weaving well it can make the grey fabric will be more risk to ripped and stain and it will be reject product.

c) Chemical preparation for dye

The quality of preparation of dye also as the problem at the material. Sometimes the chemical preparation was send in bad quality and it can make they can mix well with the other chemical preparation, in example bad urea, bad urea can make the dye for fabric will not give excellent color maybe it will be darker than the design and when it can mixed will it can risk to produce stripped or stain fabric.

For this problem this company is already take action for their supplier, they will return the reject grey fabric to the supplier and the supplier will give some penalty cost and must change it with the new one. Because the company also have lead time of production to the customer, so it's better to have quality control at the first when the company get the raw materials from the supplier so it can minimize production time and waste wage for the workers.

k. Machine

Based on the problem about five types reject for fabric production machine is also as the main cause that make the reject for the production because all of the production process is run by the machine. There are some machines in this production process but the most influence machine that can produce reject product are flat printing machine, steamer machine and stenter machine. Type of reject stain, stripped, overleap, boing, spotted is mainly cause by flat printing machine.

When the setting of the machine is not suitable with the procedure it will make run of the fabric is chaos. The wrong setting is like set the speed of blanket and dancing, it can be make stripped product. When there is not suitable setting for the stenter machine, it will cause pierced and ripped fabric. The wrong setting for the steam at steamer machine also can make the fabric is stripped and repeat stripped. The other problem is because the condition of the machine itself. Because lack of maintenance of the machine it can machine can't work optimal, like the mostly problem occur is suddenly the flat printing machine is died, rackel can't run optimal and other problem.

Based on the problem occurred is much better for the company give the routine maintenance for all of the machine at production process rather than repair when it already broke up. It because the cost of maintenance it will be cheaper rather ran than reparation, also when the machine maintain routine the possible problem of the machine will be predict early and take action for the machine so the machine condition not disturb the production process. Routine maintenance also can increase machine productivity and performance of the machine in order to produce optimal and reduce the reject product.

For the setting problem, it will better for the company choose some exact professional worker at each shift of production that can set the machine perfectly so it can minimize the reject of product.

I. Method

For method, it can cause the reject based on the problem of reject.

a) Reject type spotted and stain

The wrong method can be from how to put and take the fabric from lorry to lorry is carelessly so it can make the fabric will dragged along the floor and it will make the spotted or stain along the fabric. Second is because the way to mix the dye is imperfect. Third, because of process of washing the grey fabric is not follow the SOP and it still not clear and when dye is print around the fabric it will make spotted or stain. Also sometimes, there are some design that prone to make the color spilled out because of the complexity of the design component.

b) Reject type overleaping and boing

Problems for overleap are because the worker slack when they positioning screen and bad in make fabric connection so when the one fabric is finished to print and

continue with the other fabric, the position will be move and make the dye overleaping.

c) Reject type pierced and ripped

The wrong method are there is no inspection for grey fabric, in scoring process, sewing process, and how set the speed of machine. Because there is no inspection in grey and scoring it make the ripped fabric is run through the next process.

d) Reject type stripped and repeat stripped

For this kind of reject, the wrong methods are unbalancing to set the machine and how to pour the dye component. It similar to spotted and stain, but for stripped and repeat stripped mostly failure is occurred when set the steamer machine, sometimes it will longer or faster so the color of fabric will stripped.

e) Reject type exlip

For exlip problem the wrong methods are when set the flat printing machine and reposition the fabric at the stenter machine.

Based on the problem, the suggestions are: make written SOP; give detail training, instruction, and simulation; and give inspection process for the grey fabric.

Make the SOP in all around the machine as a written SOP and put it. Because at the production area there is not written SOP for each machine and division so when there is problem occurred, it will easily to evaluate in what step the workers fail to follow the steps.

Give detail training, instruction, and simulation.The other suggestion is give detail training instruction for the workers and simulate them how to work based on SOP, because some workers didn't know how to conduct their work when read the SOP.

Give inspection process for the grey fabric. It will better for this company to implement an inspection process for the grey fabric or when it will too difficult the inspection can be combine with the scoring process. It can be more effective, because the pierced and ripped grey fabric can be separated and stop to process from printing until finishing.

m. Environment

For the environment is not give the big impact for the type of reject, it just the room temperature is hot so make the worker uncomfortable and make some mistakes,

but the frequency is seldom. The environment problem is just for the pierced reject because of the mouse.

For that the suggestion is give more fan or cooler at the production area and keep the warehouse from the mouse by put more camphor.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1. Conclusion

Based on assignment and result which conducted by student on the work practice in Quality Control Department at PT. Hadiputra Gemilang, so here is conlusion of work practical report:

a. Production process that conduct on PT. Hadiputra Gemilang especially for production process in batik garment is good enough but it should be increase and evaluate continuously.
b. Types of reject that often found in batik garment are stripped, stain or spotted, pierced or ripped, overleap, boing and exlip.
c. For sarong and hood the most reject was found is the connection and this type of reject can't be avoid because in every fabric there will be connection.
d. Many rejects type comes from some roots of problem such as material, man, machine, method and environment.
e. For material problem it can be manage by doing inspection before production process especially for grey fabric and chemical preparation.
f. For man problem, it can be manage by training and motivating the worker so the worker can be struggle in working area and give the best work.
g. For machine problem, routine maintenance for machine should be conduct.
h. For method problem, the written Standard Operating Procedure must be distributed in every level of worker so when there exist problem it can be easily evaluate.
i. For environment problem it can be better if production area is given some cooler so temperature will not too hot for worker and make worker more comfortable.

5.2. Recommendation

a. For grey fabric, it will better to conduct the inspection when it arrive from supplier, so defect fabric can be known early before production process.

b. Production department should be seriously take concern and control with inspection data from Quality Control Department and make the data as evaluation for next production process.

c. For inspection process in cutting product and textile product, type of reject found can be completed in the inspection form so data get will more completed.

d. Regulation for workers must be more strike when they doing some mistakes, so production process will be better and not make this company loss its profit.

REFERENCE

Besterfield, Dale H.1994. Quality Control Fourth Edition. Prentice Hall Career & Technology: United States.

Mitra, Amitava. 2016. Fundamentals of Quality Control and Improvement Fourth Edition. John Wiley&Sons, Inc.,Hoboken, New Jersey : Canada.

Cahyono, Hendri. 2012. *Analisis Pengendalian Kualitas Produk Jadi Kain Batik Jenis Santung pada Perusahaan Batik Bengawan Indah Surakarta. Jurnal Teknik Industri, 51-65.*

Dewi, S.K.2012. *Minimasi Defect Produk dengan Konsep Six Sigma*. *Jurnal Teknik Industri, 43-50*

Lampiran 2. Lembar Bimbingan Pelaksanaan dan Penyusunan Laporan Kerja Praktek (QSR No. 086-QSR/Ind-FTI-UAJY/18-VIII/2017)

Program Studi Teknik Industri Universitas Atma Jaya Yogyakarta
Lembar Bimbingan Pelaksanaan dan Penyusunan Laporan Kerja Praktek/ Magang

Nama Mahasiswa : Giovani Natalia Widodo
NPM : 15408940
Perusahaan tempat KP : PT. Hadiputra Gemilang
Tanggal pelaksanaan KP : 18 Desember 2017 - 23 Januari 2018
Dosen Pembimbing : Ir. B. Kristyanto, M.Eng., Ph.D.

No	Tanggal	Agenda	Tanda Tangan Dosen Pembimbing
1	01/02/18	Penyerahan surat pembimbingan dan Konsultasi persiapan Kerja Praktek	
2		Laporan atau konsultasi penugasan dari perusahaan	
	15/02/18	Laporan pertama setelah pelaksanaan Kerja Praktek dan konsultasi penyusunan laporan	
	12/05/18	Penyerahan draft laporan Kerja Praktek untuk pertama kali	
	29/05/18	Pengesahan laporan Kerja Praktek	

Program Studi Teknik Industri Universitas Atma Jaya Yogyakarta
Catatan Harian Pelaksanaan Kerja Praktek

NO.	HARI, TANGGAL	JAM	KEGIATAN	TANDA TANGAN & STEMPEL PERUSAHAAN
1.	Senin, 18 Desember 2017	07.00 – 09.00	keliling pabrik untuk mengetahui area produksi batik, dari kain mentah sampai kain putih jadi, mengamati proses scooring, stanter, pemartaian dan printing	
		09.00 – 12.00	pembagian tugas, di divisi PPIC. Mengamati bag dimana penjadwalan dilakukan dan mencatat data potongan kain	
		12.00 – 13.00	ISTIRAHAT	
		13.00 – 15.00	kelliling area warehouse untuk penyimpanan barang mentah dan barang jadi. dimana di warehouse tersebut terdapat proses quality control, cutting dan calender.	
		15.00 – 17.00	kelliling area produksi lantai 2 dimana proses yang diamati ada menjahit, labelling, packaging dan inspeksi barang jadi.	

Catatan penting harian: Flow proses kain. Kain mentah akan mengalami penyusutan sebanyak 7-10 meter setiap kainnya. Proser pertama, kain mentah akan mengalami proser scooring yang tujuannya untuk menghilangkan kanji kain (dicuci). Selanjutnya, kain yang sudah discooring akan dibawa menggunakan lori menuju proses setting menggunakan mesin stanter. Di mesin stanter ini kain akan dikeringkan, pemartaian, penentuan lebar kain. Setelah di proses stanter kain akan menjadi lebih lembut. Setelah itu kain akan mengalami proses printing (pembuatan design / motif).
- Terdapat 3 shift kerja di pabrik ini.
- U/ supplier : PT. Sritex, PT. Dunia Tex, PT Agung Tex, PT. Sami Tex (U/ kain putih dari Solo) PT. Multikimia, PT. Kerang sakti, PT. Colour Indo, PT. Teratai Mas, PT. Dwi Nirta PT. Nitra Kimia Mas, PT. Chemstar (U/ pewarna) dari Bandung & Tangerang.

Catatan dari pembimbing lapangan: